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India
Strengthening Institutions for Sustainable Growth

Country Environmental Analysis

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Acronyms and Abbreviations

ADB	Asian Development Bank
BOD	Biochemical Oxygen Demand
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CEM	Continuous Emissions Monitoring
CETP	Common Effluent Treatment Plant
CII	Confederation of Indian Industries
COD	Chemical oxygen demand
CPCB	Central Pollution Control Board
CREP	Corporate Responsibility for Environmental Protection
CRRI	Center Road Research Institute
CSE	Centre for Science and Environment
CTE	Consent to Establish
CTO	Consent to Operate
DoE	Department of Environment
EA	Environmental Assessment
ECOP	Environment Codes of Practices
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management Systems
ENVIS	Evironmental Information System
ESI	Evironmental Sustainability Index
ESMAP	Eergy Sector Management Assistance Programme
ESPP	Environmental Social Policy & Procedures
FHWA	Federal Highway Administration
FICCI	Federation of Indian Chambers of Commerce
GDP	Gross domestic product
GHG	Greenhouse gases
GoI	Government of India
GoK	Government of Kerala
IDA	Industrial Development Authority
IEA	International Energy Agency
IFC	Information and Facilitation Counter
IRC	Indian Roads Congress
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
LLDA	Lake Laguna Development Authority
MNES	Ministry of Non-Conventional Energy Sources
MoEF	Ministry of Environment and Forests
MoNRE	Ministry of Natural Resources & Environment
MNES	Ministry of Non-Conventional Energy Sources
MoEF	Ministry of Environment and Forests
MoNRE	Ministry of Natural Resources & Environment
MoP	Ministry of Power
MoRTH	Ministry of Road Transport & Highways (Now known as the Ministry of Shipping, Road Transport and Highways)
MVA	Megavolt-ampere
MW	Megawatt
NEP	National Environment Policy
NGO	Non-Government Organizations
NHAI	National Highways Authority of India
NHPC	National Hydro Power Corporation
NIMBY	Not in My Back Yard
NIRD	National Institute of Rural Development

NITHE	National Institute of Training of Highway Engineers
NO_x	Nitrogen oxides
NPV	Net present value
NTPC	National Thermal Power Corporation
OECD	Organization for Economic Cooperation and Development
PCB	Pollution Control Board
PIL	Public interest litigation
PowerGrid	Powergrid Corporation of India Limited
PPP	Purchasing Power Parity
PROPER	Program for Pollution Control, Evaluation, and Rating
PWD	Public Works Department
R&M	Renovation & Modernization
RSPM	Respirable suspended particulate matter
RTIA	Right to Information Act
SCC	Supreme Court Cases
SMEs	Small and medium enterprises
SPCB	State Pollution Control Board
SPM	Suspended particulate matter
SSI	Small-scale industries
TA	Technical assistance
T&D	Transmission & distribution
TRI	Toxics Release Inventory
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USEPA	United States Environment Protection Agency
UTPCC	Union Territory Pollution Control Committee
VFG	Vital Few Goals
VOC	Volatile organic compounds

CURRENCY EQUIVALENTS

Exchange rate of the Indian Rupees for US$ 1.00

Fiscal year	Annual average rate (Rs)
2000–01	45.6844
2001–02	47.6919
2002–03	48.3953
2003–04	45.9516
2004–05	44.9315

FISCAL YEAR

April 1 – March 31

Contents

Executive Summary i
The Challenge: Rapid Growth in Extremely Diverse Natural, Economic and Social Environment i
The Study ii
Facilitating National Dialogue and Public Participation iii
Expanding the Toolkit to Enable Environmental Compliance by Diverse Sources iv
Strengthening the Capacity of Environmental Agencies to Meet Growing Demands vi
Aligning Sectoral Incentives with Environmental Priorities vii
Working Across Sectors for Common Public Good ix
The Way Forward x

I. Keeping Up With Environmental Challenges of Rapid Growth 1
India's Growth Story 1
Environmental Implications: Risks 2
Environmental Implications: Opportunities 7
Environmental Implications: The Need for More Effective Action 9
The Study 12

II. Building National Consensus through Effective Dialogue and Public Participation 16
The Challenge: Multiple Stakeholders with Opposing Views 16
The Alternative: Confrontation and Public Interest Litigation 18
The Way Forward: From Stand-Off to Constructive Dialogue 20
Making Public Participation Work 27

III. Enabling Compliance in the Regulatory Environment 31
Building on a Sound Foundation 31
Aligning the Regulatory Framework with Environmental Pressures 33
Strengthening Toolkit to Promote Compliance 39
Matching Regulatory Capacity with Regulatory Mandates in a Growing Economy 47

IV. Aligning Sectoral Policies and Incentives 55
The Role of Industrial Policy and Institutions 55
Environment as a Driver in Power Sector Development 60
Building Highways in an Environmentally Sustainable Way 72
Addressing Cross-sectoral Challenges 78

V. Towards a Sustainable Growth Framework 80

Annex 1. Summary of Study Recommendations 84
Glossary of Terms 89
References 92

Tables

Table S.1 Key Proposed Actions and Role of Different Stakeholders xi
Table 1.1 Major Polluting Industries 3
Table 2.1 Summary of Selected Public Interest Litigation and Court Directives 19
Table 2.2 Instruments of Public Participation 24
Table 3.1 Summary of Area-Based Environmental Mgt. & Planning Approaches in India 36
Table 3.2 Comparison of SPCBs or Every 100 Polluting Units in the States, India, 2003 49

Figures

Figure 1.1 A Decade of India's Economic Growth in Perspective 1
Figure 1.2 Forced Hydro, Nuclear, and Gas Scenario (Fuel Mix Year Wise) 5
Figure 1.3 Environmental Sustainability Index and Income 8
Figure 1.4 Linkages Between Economic Activity, Environmental Outcomes, and Institutions 8
Figure 1.5 Biochemical Oxygen Demand (BOD), Major Rivers, 2004 10
Figure 1.6 Respirable Suspended Particulate Matter, Residential Areas, 2004 10
Figure 1.7 Economic Performance and Urban Air Pollution in India's States 11
Figure 1.8 India SPM-10 Trends, Largest and Other Cities, 1995-2004 12
Figure 2.1 Key Stakeholders of Environment Management in India 17
Figure 3.1 Importance of Small and Medium Scale Enterprises in India 33
Figure 3.2 Status of Compliance across States in India, 2003 53
Figure 4.1 Installed Capacity of Power Generation by Source (Percentage), 2005 61
Figure 5.1 From a Vicious Circle of Confrontation to a Virtual Circle of Sustainability 80
Figure 5.2 Institutional Triangle of Environmental Management 81

Boxes

Box 1.1 The Singrauli Region: Legacy of Unsustainable Economic Development 4
Box 1.2 Key Environmental Issues in the Power Sector 5
Box 1.3 Environmental Impacts in the Highways Sector 6
Box 1.4 Case Studies of Implementation Experience 14
Box 2.1 Conflict over Development Projects in India: Examples Collected by Sector Reviews 18
Box 2.2 Government's Response to Growing Public Confrontation: Thailand 20
Box 2.3 A Framework for Public Participation in the Phillipines 21
Box 2.4 Listening to Communities with Site Specific Knowledge 21
Box 2.5 Notification for the Re-Engineering of the EIA Process in India 23
Box 2.6 Examples of Citizen Involvement in Monitoring and Oversight 25
Box 2.7 The Impact of the Right to Information on Environmental Performance in the US ... 26
Box 3.1 Key Environmental Legislations in India 32
Box 3.2 Setting Feasible Emissions Standards in the Country-specific Context — Lessons from India's Coal Power Plants Story 38
Box 3.3 Cooperative Approach to SMEs — A Good Practice Example from Kolkata 40
Box 3.4 Use of Administrative Enforcement Authorities as a Credible Deterrent 42
Box 3.5 Economic Instruments for Pollution Control: Potential for India 44
Box 3.6 Promoting Environmental Management Systems 45
Box 3.7 Expanding the Toolkit – the Power of Public Disclosure 46
Box 3.8 Proposed Capacity Building Action Plan for the Orissa Pollution Control Board 52
Box 4.1 Key Reasons for Better Environmental Management in Naroda Industrial Estate 56
Box 4.2 "Greening Supply Chain" Initiatives 59
Box 4.3 Energy and Environmental Challenges: A Global Perspective... 60
Box 4.4 A Planned Transition to Cleaner Electricity Generation is Complicated by Severe Shortages of Power 63
Box 4.5 PowerGrid – Corporate Leadership in Sustainability 64
Box 4.6 Brazil-China-India Energy Efficiency Assessment: Recommendations for India 68
Box 4.7 Internalizing Environment and Social Processes in Road Projects 73
Box 4.8 Environmental Intervention in the National Road Transport Policy 73
Box 4.9 Institutional Mechanisms to Promote Comprehensive Integration of Environmental Impacts in Highways Development — International Good Practice . 75
Box 4.10 Integrating Environment Management Measures in Construction Codes and Technical Specifications 77

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Executive Summary

1. For over a decade, from the early 1990s, India has experienced one of the fastest economic growth rates in the world, averaging over 6 percent and reaching 7–8 percent per year since 2003. While the country still continues to face the tremendous challenge of reducing poverty for 354 million (representing 27 percent of the world's poor) of its over one billion population, robust economic growth has already allowed millions to emerge from poverty creating a sizable middle class of 300 million people. This growth has been a dramatic driver in the nature and scale of impact on the country's environment and natural resources.

The Challenge: Rapid Growth in Extremely Diverse Natural, Economic and Social Environment

2. Given the high population density, vulnerable ecology, extreme climate and a significant share of the economy heavily dependent on the natural resource base, **environmental sustainability might well be the next greatest challenge along India's development path**, adding to the list of priority needs, such as reducing disparity, eliminating poverty and promoting social cohesion. Mirroring the country's size and diversity, environmental risks and problems are wide-ranging. India's dual features of a low income economy and a middle income economy are reflected in the environmental damage estimates. The damages are still dominated by "poverty-related" risks, such as lack of sanitation and indoor air pollution in rural areas. However, the share of "growth-related" risks manifested by the deteriorating urban environment, industrial waste and chemical pollution is increasing. As the country finds itself into the second decade of strong economic performance, making and further planning massive investments in infrastructure, urban development, and industrialization, the issues of managing the environmental impacts associated with this rapid growth are capturing public attention.

3. To deal with these impacts, India has developed a comprehensive set of environmental laws and institutions, including a very active judiciary. Despite a strong policy and institutional framework and some successes, environmental degradation has not been arrested on a large scale. The country-wise average compliance ratio for monitored industries (falling far short of all polluting sources) is only 50 percent. Furthermore, the trends in environmental quality indicators are mixed; for example, urban air quality (measured as suspended particular matter of less than 10 microns) has been improving in the largest cities, such as Delhi and Mumbai, where significant efforts have been made to control multiple pollution sources, while it is deteriorating in many other cities.

4. The immense unfinished agenda underpins the deepening dissatisfaction with the state of environmental affairs by a growing and increasingly vocal "green" constituency, resembling, in some ways, a historical pattern of 1960s in industrialized countries. A **rising public demand for better environmental quality,** often driven by the influential urban middle class and backed by the judiciary (as in the famous case of cracking on Delhi's air pollution), is being increasingly matched by voluntary environmental performance obligations from India's large-scale corporate sector and industry asserting a prominent role in the global market.

5. **This demand, however, is yet to be matched by the regulatory capacity of environmental agencies**. While the capacity of the Ministry of Environment and Forests (MoEF), the Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs) has improved over time, keeping up with the challenges of rapid growth has proved difficult. Many would argue that the judiciary filled the vacuum left by the lack of regulatory oversight. India's enormous economic and social diversity needs to be better appreciated in this context. There are significant segments of population that have other more pressing priorities. Thus, political commitment to environmental improvement still varies by State and constituency, particularly when measured up against multiple competing needs. This has a bearing on the status and capacity of both the State and national environmental agencies. And besides a large-scale sector, there are numerous smaller scale industries (the backbone of India's growth and employment), which are often unable to adopt modern technologies that would be required for compliance with environmental laws. The understanding of the environmental impacts, their origins, consequences and cost-effective mitigation strategies, while evolving gradually, is still incomplete, particularly with respect to cross-sectoral and cumulative impacts. The understanding and perceptions significantly differ across stakeholder groups. All of this further complicates the formulation and delivery of an effective regulatory response that would benefit from a broad-based support.

The Study

6. The objective of this *Country Environmental Analysis* was to help strengthen the environmental policy *implementation* framework, to meet the challenges of a rapidly growing and extraordinarily diverse economy in India. In particular, the study aimed at assisting with the implementation of the new National Environment Policy (NEP 2006), which was released in draft for public consultation at the time this study was initiated. The scope of work was developed through extensive consultations with the MoEF, the main study counterpart, and multiple other stakeholders to focus on priority issues not covered by and complementary to recent or on-going work. Given that a review of the Environmental Impact Assessment (EIA) process was commissioned by the MoEF earlier and was nearing its completion at the time this analysis was about to start, this study focused on identifying and proposing ways to address major gaps in the existing institutional arrangements, as well as regulations and incentives for post-EIA *environmental compliance and performance.*

7. In view of the focus on the growth–environment nexus, the study covered three select sectors — industry, power (including three distinct sub-sectors: coal-based power generation, hydro power generation, and transmission), and highways — that are among the key drivers of growth. Together, these sectors represent a wide range of environmental impacts, sources and regulatory issues that allows drawing conclusions of broad relevance. The analytical framework used by this study was a combination of sector-wide reviews, based on secondary data of issues, policies, regulations and institutions, with several case studies of implementation experiences. Ranging across seven Indian States, the project-level case studies helped to gain a deeper understanding of barriers, as well as contributors, to better environmental compliance and performance in the real-life situation. The case studies involved primary data collection and consultations with local stakeholders. Selective reviews of international experience in environmental management were also conducted. The findings from all reviews and case studies have been integrated to leverage support for corrective actions building on a growing number of good practices in India and internationally.

8. A central feature throughout this study has been the extensive consultations and dialogue with various concerned sectors and players. Roundtable discussions, meetings, brainstorming events and workshops took place in December 2004, April 2005 (launch workshop), June 2005, August 2005, December 2005 (multi-sectoral consultation workshop on early findings) and July–August 2006 (consultation on the draft final report). A major public (non-governmental organization; NGO) consultation workshop was held in July 2006, followed by meetings with government representatives of all the sectors involved (environment, industry, power, and highways). In addition, several consultations were held by study consultants during summer 2005 with local stakeholders at the project sites selected as case studies. The draft report was also posted on the Internet for broader public review and feedback during June–July 2006.

9. A highly consultative process was particularly important because, from the onset, the main added value of this exercise was not as much in producing new knowledge or a new analytical result, as in helping to develop a *commonly shared* vision on the way forward, reconciling different perspectives by diverse stakeholders. The importance of this approach was further reinforced by a conclusion from the study that the lack of effective dialogue among opposing stakeholders is becoming a binding constraint to further progress, so much desired by the very same stakeholders.

10. The key findings and recommendations of the study are grouped under five themes: (i) facilitating national dialogue and public participation; (ii) expanding the regulatory toolkit to enable environmental compliance; (iii) strengthening the capacity of environmental agencies to meet the growing demands, (iv) aligning sectoral incentives with environmental priorities; and (v) working across sectors.

Facilitating National Dialogue and Public Participation

11. While the impetus for change and more effective action is building up and being recognized, albeit to a varying degree, at all levels and by all players, **there is a serious breakdown in public trust and constructive dialogue** with respect to addressing a very complex and non-trivial set of issues. Increasing confrontation and suspense make the much needed environmental management reforms difficult to agree upon and implement, further exacerbating environmental problems. There is an urgent need to start working towards developing **a commonly shared vision on the way forward,** involving all principal stakeholders and reconciling diverse perspectives.

12. Managing expectations from the public and decision-makers regarding the public participation process is important. Successful public participation does not just happen. One of the key recommendations is to **carefully plan and execute a long term national program for supporting public participation in environmental management** aimed at educating and building capacity of all stakeholders involved. The first step could be to develop detailed guidelines, as well as provide training, on public participation for both State-level environmental authorities and sectoral agencies (adjusted to sector's specifics). Significant attention should be given to **building civil society capacity** at the community level to help communities understand the environmental issues and linkages to sector activities, and thus effectively garner participation in public forums. Overall, the program should be designed and targeted according to the diversity of India's stakeholders (with some of non-government stakeholders being more educated than the regulator).

13. While it is very important to increase the effectiveness of the more traditional forms of public participation, such as public hearing, the program should also **promote innovative and more interactive approaches** that can increase the level of public awareness, involvement, and ownership of environmental problems and solutions. One such example, already piloted in India, is the citizen involvement in environmental monitoring and enforcement, which should be further supported.

14. Furthermore, **the passage of the Right of Information Act (RTIA) provides a valuable opportunity** for developers and regulators to improve public relations, which they cannot afford to miss or under-utilize. It is important to widely disseminate policy guidelines on the type of information the public has access to. The Information and Facilitation Counter (IFC) launched by the MoEF in December 2005 is an excellent initiative to make information easily available. This should be extended by making special efforts and arrangements to effectively reach out to the entire country, including remote locations.

15. Effective environmental enforcement requires informed consensus on environmental management objectives and policies that are based on a good understanding of **the shared roles and responsibilities of all players**, including the regulator, the regulated community (developers and polluters) and the affected community (general public). This fundamental notion of *shared responsibility* is currently challenged in India by the general perception among the public, project proponents, and development authorities alike that environmental ills are the sole responsibility of environmental agencies failing to effectively implement and enforce the laws. As India's economy continues to accelerate, the performance of the environmental regulator will come under increased scrutiny and pressure. The study shows, however, that unless an increasing public demand for better performance by the environmental regulatory agencies is matched by adequate support to these agencies, conditioned on institutional reforms to increase efficiency, transparency and accountability, it would be naive to expect substantial progress and unfair to solely blame the regulator for the lack of it.

Expanding the Regulatory Toolkit to Enable Environmental Compliance by Diverse Sources

16. The analysis revealed that **much remains to be done to strengthen the regulatory, enforcement, and incentive mechanisms at the disposal of environmental agencies**. The main focus on large point sources in applying environmental regulations does not match the scale and diversity of the India's economy, with its multiple pollution sources, dominated by small-scale industrial units or often being outside the industrial sector. Nor is it responsive to changing pressures resulting from the country's accelerated growth, such as unwieldy urbanization and regional development that are overstretching both public infrastructure and the carrying capacity of the natural environment; massive expansion in highways and transmission lines; or private investment in power generation using imported coal with different properties than those the current regulation is designed to control. At the same time, as highlighted in the NEP 2006, enforcement efforts are undermined by the lack of credible deterrents: the two key sanctions currently available to the regulator — filing a criminal case against a violating company or issuing an order to shut it down — are either too time consuming to pursue or too extreme to be routinely used.

17. In sum, **the toolkit the regulators use to facilitate compliance needs to be considerably expanded and strengthened** to adequately deal with a very diverse regulated community. This would require **new regulatory programs and approaches for different categories of priority sources, particularly targeting activities other than large point sources** that cause significant *cumulative* environmental impacts. Specifically, there is a need for regulatory programs targeting: (i) numerous small and medium enterprises (SMEs), estimated by the MoEF to account for 70 percent of the total industrial pollution load; (ii) the growing municipal sources of pollution; (iii) multiple industrial, municipal and transport sources contributing to environmental degradation in a particular area or ecosystem; and (iv) linear projects with complex direct and indirect (induced) impacts, such as the highways projects. The new regulatory programs should be designed to (i) deliver a credible threat of enforcement, using, where needed, innovative methods and mechanisms tailored to a targeted group of sources; and (ii) make a greater use of suitable economic incentives, particularly for small-scale businesses with higher abatement costs. Some actions are already being taken but a bolder and more systematic effort is needed.

18. The study recommends wider dissemination of and learning from recent successful examples in India and elsewhere of **effective packages for clusters of SMEs that combine focused enforcement effort with extensive outreach and compliance assistance** in the form of knowledge, capacity building, and financial aid, such as a matching grant or soft loan, to help with the cost of adopting a cleaner technology. The emerging lessons could be used for initiating a **national program for SME clusters that would guide the design and implementation of suitable packages at the local (municipality) level** tailored to the specific local circumstances. The program could also provide matching grants for compliance assistance, expanding the current initiative by the MoEF that supports the construction of common effluent treatment plants (CETP) for SME clusters to other pollution control and prevention measures identified as priority by the respective local program. When applicable, it would be also useful to facilitate, as part of this program, access to carbon finance (as in the case of energy efficiency/clean fuel switching measures) or other concessional global environmental financing instruments.

19. To deal with multiple sources of pollution within a particular area, it would be important to build on lessons from considerable past experience in India and internationally for **designing more effective area-based pollution management programs,** particularly for new priorities, such as urban air quality action plans or hazardous waste management. Making this approach more effective for India would likely require linking it with the decentralization process and local government agenda, strengthening the authority of municipalities and regional development authorities, and enabling them to facilitate integration of multiple sectoral strategies and stakeholders.

20. **Better recognizing the vast diversity of regulated sources in applying national discharge standards** is another important area of refining regulatory approaches towards ensuring a greater level of compliance**.** The process of setting source standards should better recognize significant differences in the ability to adopt pollution control and cleaner process technologies required for meeting these standards, between large and small units and between new and old facilities (particularly old public utilities, such as power plants). There is a need to strengthen and clearly define the methodology for an *economic impact assessment* of the proposed environmental standards and regulations, drawing on best international practices. This assessment would provide a scientific basis for differentiating the requirements between

different categories of sources, as well as allowing a phased implementation schedule, adjusted to different sources and locations, which is feasible for meeting the new requirements. At the same time, regulations should be backed by credible enforcement sanctions for failure to meet new standards by the established deadline as well as provide practical incentives to facilitate compliance with the new standards ahead of schedule (an approach often used by the European Union countries).

21. One of the top priorities is to strengthen the current system of punishment for environmental violations that is too difficult for routine implementation in the situation of widespread non-compliance. It would be important to **promptly evaluate, refine and expand the recently introduced bank guarantee system** in select States (an application of the environmental performance bond instrument), as a condition of renewing an environmental license ("Consent to Operate") for violators. There is also a need for exploring other innovative schemes to strengthen enforcement deterrents, as environmental bonds are not appropriate for all circumstances, building on the NEP (2006) that calls for "a judicious mix of civil and criminal processes and sanctions" (MoEF, 2006, page 17).

22. In addition to the above priorities, **there is a double benefit to regulatory agencies from recognizing and encouraging good environmental performance and voluntary initiatives by the industry**. The Charter on Corporate Responsibility for Environmental Protection sets a good example of a collaborative process to expand upon through some regulatory incentives, such as extending the duration of CTO or/and reducing the frequency of inspections for industries that demonstrated a good record of past performance, obtained ISO 14001 certification, or introduced environmental auditing or sustainability reporting. This provides an additional (even if small) incentive for other industries to follow and to innovate further. It also allows SPCBs to focus their scarce resources on serial offenders and other priorities. There is a significant and under-realized scope for providing such support, using good practice examples of a handful of SPCBs.

23. **Public disclosure of environmental information and citizen participation in monitoring** have the power to motivate better compliance by holding the industry and government agencies accountable for their performance and decisions. It is important to continue supporting citizen-monitoring efforts that CPCB/SPCBs have initiated by promoting public–private partnerships for compliance monitoring and establishing public notification procedures for sharing relevant data.

Strengthening the Capacity of Environmental Agencies to Meet Growing Demands

24. **Matching the capacity of the regulator with the multiple and expanding regulatory mandates in a rapidly growing economy is a major challenge**. There are significant capacity constraints of State environmental agencies to meet their existing mandates, as well as the need for introducing new regulatory programs and tools and improving the effectiveness of existing ones. Furthermore, the pressures for processing consents to establish and operate (CTEs and CTOs), as well as for conducting inspection visits, are increasing for most SPCBs due to continued rapid growth, adoption of shorter timelines for approving new investments, and a larger number of units to monitor. In addition, public interest litigation (PIL) and other court cases against SPCBs are on the rise in many States, which - albeit a positive sign of civil activism - is further eroding the capacity of

SPCBs to inspect and enforce as its already limited staff resources are re-allocated to dealing with those cases. Notwithstanding that the volume and complexity of workload is growing disproportionately to the staff, skills and resources, State governments often exacerbate the situation by indiscriminate hiring freezes.

25. The study recommends that the MoEF and CPCB consider, using recent examples of several SPCBs, requesting and guiding all SPCBs to develop a **medium term capacity strengthening action plan** to meet the current and projected workload, including the requirements of the RTIA and the recent increases in court cases. These plans should first explore the possible efficiency gains through: (i) rationalizing processes (e.g. linking consent duration and inspection strategy to environmental risks and performance of a facility); (ii) upgrading technology (e.g. full computerization of application processing, greater use of continuous environmental monitoring when possible); (iii) decentralizing responsibilities to regional offices, along with staff, resources and equipment; outsourcing certain non-core functions; (iv) training to upgrade skills, etc. It would conclude with a staffing plan including a possible need for additional positions to meet the core needs, upon exhausting all options for improvements in processes and efficiency. The plan could then be used for negotiations with State governments over additional staff positions, subject to making a strong and verifiable case.

26. Furthermore, a system of oversight between the center and States needs to be strengthened to ascertain **greater accountability for the level of performance** by State environmental agencies, which varies greatly across states. The MoEF and CPCB could consider introducing a performance-based program of support to SPCBs, which would be rewarded for exceeding the agreed performance targets, in addition to the "needs-based" technical assistance to SPCBs with particularly low capacity (e.g. in new and/or poorer States). Improving efficiency and accountability of the forests departments in providing the forestry clearance and performing compensatory afforestation is another priority action area.

Aligning Sectoral Incentives with Environmental Priorities

27. In addition to the critical roles of the environmental regulator and the civil society, there is also **a fundamental need for sectoral agencies to facilitate better environmental compliance and performance** of individual projects, more sustainable development of the sector as a whole and a greater cross-sectoral coordination, particularly at the planning stage. Case studies and sector reviews show that environmental monitoring and enforcement of specific sources can do very little to improve the situation on the ground if environmental factors are not considered at the time of location decisions, spatial planning, project design, and technology selection. Sectoral agencies and local governments are typically better positioned to influence these choices than the environmental regulator.

28. **The industry sector** agencies can significantly influence environmental outcomes by: (i) integrating environmental objectives in the State Industrial Policy, already done by several, though not all, States; (ii) linking industrial promotion incentives (such as tax holidays and soft loans) to environmental risks and performance, for example conditioning incentives on securing an environmental performance bond by industries with hazardous processes; (iii) coordinating with SPCBs and municipalities for better planning and zoning that integrate environmental considerations, including the need for common environmental infrastructure; (iv) organizing programs to raise awareness of business opportunities linked to

good environmental management, using increasing examples within India; (v) promoting partnerships between larger industries and smaller suppliers, such as "green supply chain" initiatives; and (vi) facilitating environmental knowledge sharing and training by business associations, particularly in "emerging" States with massive new development investments (e.g. Chhattisgarh, Jharkhand, and Orissa).

29. In the **power sector**, there is significant synergy between the three core drivers shaping future development of the sector. These are: (i) meeting a growing demand for electricity at affordable cost; (ii) ensuring long-term security of primary energy supply through an appropriate mix of sources; and (iii) minimizing the environmental impacts — at the local, regional and global level. Nevertheless, **there are a number of areas where further alignment of sectoral policies and programs with environmental considerations is required**. These include: (i) a more focused effort to promote the uptake of energy efficiency and conservation measures on the ground; (ii) enhancing energy efficiency and environmental considerations in coal-based generation, including the construction of new plants and the Renovation & Modernization (R&M) program for old coal fired power plants; (iii) strengthening incentives for ash management and use of better quality coal; and (iv) creating a stable regulatory environment for renewable energy generation at the State level. It would be also useful to include environmental indicators of sector performance in the Ministry of Power (MoP) online database and annual reports.

30. Furthermore, the recent introduction of the Net Present Value (NPV) for diverted forest land has illustrated that environmental regulation can significantly influence the cost and tariff structure of power generation and transmission projects, and skew the market of power generation in favor of certain primary energy sources and technology choices over others. The impact of the NPV payment that has been particularly felt by new hydro power projects highlighted **the need for a comprehensive and consistent methodological framework for estimating and accoung for all relevant externalities.** This would help assess the full economic costs and benefits of alternative power sector technology choices at the project and system level, and devise regulatory and/or financial incentives to be provided to investors in generation that would faciliate optimal technology and/or energy source choices.

31. In the rapidly expanding **highways sector** the key recommended sector specific actions are: (i) strengthen mechanisms, at both policy and implementation level, to take better account of the indirect, induced cross-sectoral and cross-boundary impacts, based on best practices available in India and internationally; (ii) provide technical guidance on key environmental management aspects through sectoral Guidelines; (iii) integrate environmental management measures in the updated construction codes and technical specifications for highways and road projects; and (iv) develop a manual for translating provisions of the Environmental Management Plans (EMP) into contract clauses to improve the implementation of EMP and environmental performance of contractors.

32. **The environmental agenda provides additional opportunities to support the development of a modern and efficient sector.** This is particularly evident in the power sector but applies to other sectors as well. Around the world, national environmental requirements have often steered technological innovation, energy conservation, management improvements, better planning, and superior design that, in the longer term, become beneficial for sector-wise and economy-wide performance. As concerns about global

environmental issues, such as climate change or toxic chemicals, have led (and continue to lead) to the development of international concessional financing mechanisms, along with efforts related to knowledge, technical assistance and technology transfer, these instruments can and should be more effectively used by India to reinforce and advance sector development objectives and national environmental priorities. For example, India represents one of the largest potential markets for carbon-reducing investments under the Clean Development Mechanism (CDM). Following a meeting of G-8 countries in summer 2005, the *Investment Framework for Clean Energy and Development* is being developed to accelerate investments that can meet the growing energy demands in an environmentally sustainable manner. It is important for government agencies and private sector players in India to become an active and *informed* participant of this process, highlighting the need for **a country-specific strategic assessment of "low carbon" economic growth options.**

Working Across Sectors for Common Public Good

33. There are also important **common needs** highlighted by all stakeholders of environmental management. Summarized below, these could be **good entry points for working together** and building constructive partnerships.

Improving Access to Information, Knowledge and Training

34. There is a **general consensus that all institutions — representing environmental, sectoral, and civil society stakeholders — can play a key role in strengthening the knowledge base and technical capacity** that are important in minimizing the environmental impacts of development. Much of the information is already being provided by various institutions, and it is important to focus future efforts on: (i) disseminating it more evenly across the country; (ii) providing high and *comparable* quality sector-specific training across States and organizations; and (iii) developing targeted, well-designed and well-delivered programs for community learning.

Strengthening Cross-sectoral Coordination

35. The lack of effective mechanisms for inter-agency coordination is too often at the root of environmental management problems, including difficulties with compliance and enforcement, as well as failures of common environmental infrastructure. It is thus critical, for both sectoral and environmental authorities, to **evaluate, share and promote national best practice examples** of State-level policies and institutional mechanisms, as well as relevant international experience that enable early and meaningful participation of environmental agencies in the planning and design of infrastructure and industrial development projects. Examples from sector reviews include the Environment and Social Management Framework for the highways sector by the Government of Gujarat; and the efforts of the Government of Andhra Pradesh to integrate environmental considerations into industrial development planning. The Charter on Corporate Responsibility for Environmental Protection drawn up jointly by the industry and MoEF/CPCB is another good example of a collaborative action to follow.

Empowering Local Governments

36. New priorities and programs, such as urban air quality action plans, programs for SME clusters, or other area-wise pollution management programs, will require even greater cross-sectoral cooperation and integration within a particular municipality or other spatial zones. Municipal or other appropriate local governments appear to be best positioned to have the right incentives to ensure the coordination needed. It would be thus important to provide them with sufficient authority and capacity to forge such coordination. **Devolving more powers to and building capacity of local governments,** set in motion by the 73rd and 74th Constitutional amendments, would be necessary for developing and implementing environmental management programs aimed at measurable improvements of environmental quality in the areas of their jurisdiction, with the participation of all concerned sectors, as well as citizens.

The Way Forward

37. **The emerging environmental agenda is of immense proportion**. The needed institutional changes and large-scale improvements on the ground will require national commitment and consensus on a program of actions spanning over the long-term. Many of the measures would involve further examination, design, as well as consultations with the public, other government agencies, and the regulated community. It will also require that environmental agencies, sectoral institutions, and the general public patiently work together to progress towards the objectives set out in the NEP.

38. An enormous agenda is not new for India, which has on numerous occasions risen to meet such challenges. Encouragingly, many steps and initiatives setting the right direction have been recently taken by various players, including the environmental regulator. It would be important to move quickly towards reaching a broad agreement with all major stakeholders on the priority actions, starting with the identified list (Table S.1), and **develop a medium- to long-term program of implementing the agreed actions** supported by necessary resources, monitorable targets, and clear accountability mechanisms.

Table S.1: Key proposed actions and the roles of different stakeholders			
Issue/Area	**Recommended Actions**		
	Environment Agencies	**Regulated Sectors**	**Civil Society**
Promote public participation	Develop a national program, including: • Programs for raising community knowledge and capacity • Guidelines and training to SPCBs on public consultation • Programs to involve citizens in monitoring and enforcement	Develop sectoral guidelines and training on public consultation Dissemination of examples when public participation improved project performance	Collaborate on developing effective programs for public consultation and community knowledge Share local knowledge with environmental agencies and sectors
Improve access to information, knowledge and training	Publicize the Information and Facilitation Center and create its offices in other locations Develop and regularly update public on-line environmental data base Develop guidelines to facilitate the use of the Right to Information Act	Develop networks of regional centers within appropriate existing institutions to provide high quality training and knowledge across the country Develop sectoral guidelines and/or share best practices to overcome specific knowledge gaps	Proactively use the Right to Information Act to obtain local environment data Disseminate relevant information to affected communities
Set feasible standards for a diverse regulated community	Review best international practice procedures for setting/differentiating source standards and develop guidelines for India Introduce an enhanced methodology for an economic impact assessment of new regulations	Provide necessary economic information, collaborate on the analysis and facilitate consultation with the regulated community Develop, in collaboration with MoEF/CPCB a consistent framework for integrating externalities in the regulatory regime for the power sector	Provide an independent review of the proposed standards
Introduce new regulatory programs to address growing pollution sources	Develop well-packaged regulatory programs for SMEs clusters that integrate targeted enforcement with compliance assistance Develop "new generation" area-based pollution management programs dealing with multiple sources that focus on ambient quality outcomes	Provide training and capacity building to SMEs on compliance and related business opportunities Promote greening supply chain and industry mentoring initiatives Collaborate on development an area-based program	Participate in development of local SME and area-based environmental programs Allow community monitoring of SMEs and other sources of pollution in the area
Strengthen monitoring and enforcement	Adopt a plan to improve effectiveness of monitoring, including greater use of CEM technology and self monitoring data	Promote self-monitoring Offer sector rewards for good environmental compliance and performance	Develop public and disclosure "green rating" and schemes Participate in citizen monitoring programs

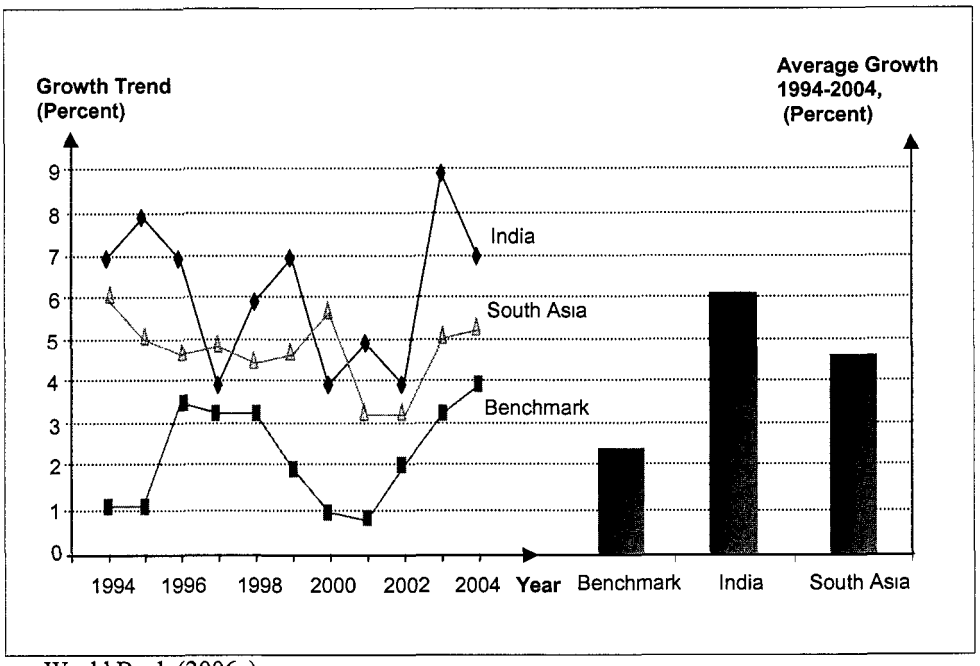
	Periodically update sectoral guidelines for monitoring, add new sectors of growing impact such as highways Evaluate, refine and expand and strengthen the pilot bank guarantee system	Provide information and technical assistance on compliance	Collaborate in public–private partnerships to improve awareness and compliance
Improve cross-sectoral coordination	Empower local government to oversee local/regional environmental programs that require cross-sectoral coordination Expand program of developing environmental zoning atlas for industrial and urban areas	Share and promote best practice examples of involving environmental authorities in regional zoning and project planning/citing/design	Organize early involvement of civil society groups in zoning and planning activities, and oversight of local environmental programs
Promote good environmental performance by sectors	Develop a set of regulatory incentives to support voluntary initiatives, using existing good practices Collaborate on developing incentive packages for energy efficiency and clean coal Coordinate the development of a strategic framework for using global environmental financing instruments	*Industry*: Integrate environmental objectives in the State Industrial Policy and link promotion incentives to environmental performance *Power*: Provide incentives for better ash management and enhanced R&M of coal plants; include environment performance indicators in MoP database and annual reports *Highways*: Integrate environmental management measures in codes and specifications through a system of periodic revision; develop a manual for incorporating EMPs in contract documents	Public green rating and disclosure programs Citizen monitoring and awareness raising programs
Strengthen regulator capacity and oversight of its performance	Develop/implement medium-term capacity strengthening action plans to meet growing mandates of SPCBs Review and recommend measures to improve the forestry clearance process Strengthen an oversight program for SPCBs, including performance-based incentives	Provide inputs/suggestions for improving effectiveness and efficiency of processes	Participate in developing capacity upgrading action plan Provide independent verification of regulator performance

I. Keeping Up With Environmental Challenges of Rapid Growth

India's Growth Story

1.1 Indian economy is one of the fastest growing in the world with a consistent average growth of about 6 percent over the past decade (Figure 1.1). Since 2003, growth reached 7–8 percent per year, and the country aspires to achieve and sustain an average annual growth rate of 8 percent or higher, much needed for eliminating poverty among 354 million of its population, representing 27 percent of the world poor[1].

Figure 1.1: A Decade of India's Economic Growth in Perspective



Source: World Bank (2006c)

Note: Benchmark countries: Average annual growth rates are computed for those countries that had similar level of per capita income to India in 1994. South Asian countries include Bangladesh, Pakistan, Nepal, Sri Lanka, and Bhutan

1.2 While poverty, disparity and challenges remain, robust economic growth has already allowed millions of people to emerge from poverty. The national poverty ratio has halved from 36 to 18 percent in less than ten years, from 1994 to 2002 (National Institute of Rural Development (NIRD), 2003). Estimates suggest that about 300 million of the approximately one billion population has joined the middle class[2] in India.

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[1] Defined as those living on less than one US dollar per day (purchasing power parity).

[2] United Nations Environment Program (UNEP) defines middle class as those earning in excess of US$ 7,000 per

Environmental Implications: Risks

1.3 Rapid economic growth and the resulting changes in consumption patterns are drastically changing the nature and scale of impact on the country's environment and natural resources, thus testing the carrying capacity of the natural ecosystems upon which much of the country's economic growth depends.

1.4 Growth of India's economy is led by robust performance of the industrial sector. Impressive growth in manufacturing (7 percent average over the past 10 years) is a reflection of growth trends (Reserve Bank of India, 2005) including electronics and information technology, textiles, pharmaceuticals, and basic chemicals. These industries, belong to the "red category" of major polluting processes designated by the Central Pollution Control Board (CPCB), and have significant environmental consequences in terms of water effluents and/or air emissions and hazardous wastes (Table 1.1). The economic boom has also led to an increase in investments and activities in the construction, mining, and iron and steel sectors. This, in turn, is causing a significant increase in brick making units, sponge iron plants and steel re-rolling mills that use highly polluting processes.

1.5 The result is a visibly deteriorating environmental quality in many industrial townships, bringing back memories of earlier industrializations in the 1960s and 1970s (Box 1.1) and highlighting the importance of stepping up efforts to manage the externalities of accelerated growth. The Government of Orissa, for example, is expecting over 600 percent increase in the installed capacity of iron ore-based industries in the future[3], and has recently banned the location of new sponge iron industries in six areas of the State due to concerns over growing air pollution and public complaints.

1.6 A frequent (and valid) argument from the industrial community is that new investments in large industrial projects bring modern and clean technologies, and big companies, particularly those with global market outreach, increasingly adhere to sound management practices. In reality, the impact of industrial growth is more nuanced and complex. An estimated 70 percent of the total industrial pollution load is attributed to small and medium enterprises (SMEs) many of which, especially small-scale units, continue to use obsolete technologies with no or primitive pollution control methods.[4] With about 40 percent of the total value of industrial production and over 4.5 million units[5] across the country, the SME is a major engine for growth, employment and poverty reduction, raising a dilemma of balancing economic and environmental objectives. Furthermore, even with advanced technologies minimizing the impact of individual units, the *cumulative* impact of growth at such a scale and of such diversity, involving a mix of large and small industries from multiple sectors and inducing unwieldy urban development as well as outpacing the capacity of supporting infrastructure, is (and should be) a matter of concern.

[3] Data from the Department of Steels and Mines, Government of Orissa

[4] Source: Ministry of Environment and Forests (MoEF) Website, http://www.envfor.nic.in/

[5] As per 3rd All India Census of small scale industries, there are around 4.4 million units employing 24.9 million persons

Industry	Key Environmental Aspects
Aluminum	Disposal of red mud, bauxite tailings and other hazardous waste, dust emissions and high energy consumption.
Caustic	Water pollution due to disposal of brine mud, mercury and chlorine; chlorine emissions.
Cement	Fugitive dust emissions from material handling and air emissions from stack; energy consumption.
Copper	Sulphur dioxide and dust emissions; water pollution from electrolytic bath and other processes; disposal of slag from smelter.
Distillery	Water pollution due to highly organic effluent from spent wash; soil contamination.
Dyes and dyes intermediates	Water pollution due to toxic azo-dyes, highly organic colored and phenolic substances.
Fertilizer	Water pollution due to heavy metal, ammonia and fluoride bearing effluent, ammonia emission, fluoride bearing dust and hazardous material.
Iron and steel	Water pollution from cyanide, fluoride and heavy metal bearing effluent, dust emission from sintering, pelletization, pig iron plants; slag and dust disposal.
Leather	Water pollution, particularly from hexavalent chromium and salt in discharge.
Pesticide	Air pollution due to particulate and volatile organic compounds; effluent containing pesticides residues.
Petrochemicals	Water pollution due to phenol and benzene containing effluent; fugitive emissions of toxic and carcinogenic and volatile organic compounds (VOC); hazardous material disposal.
Pharmaceuticals	Water pollution due to organic residues bearing effluent; VOC and particulate emissions; hazardous waste containing process sludge and spent catalyst.
Pulp and paper	Water pollution from high organic and inorganic substance and chlorinated compounds in black liquor; highly malodorous emissions of reduced sulfur compounds and VOC.
Refinery	Water pollution from effluent containing organic and inorganic material, oil and solvent; air emission of particulate matters, sulfur dioxide, "benzene, toluene, and xylene", VOC.
Sugar	Water pollution due to high biological oxygen demand (BOD) and chemical oxygen demand (COD) effluent and spillage of molasses; air pollution due to combustions of bagasse, coal, etc.
Thermal power plants	Air emission from combustion, coal handling, water pollution due to discharge of boiler blow down, overflow from ash pond; land contamination due fly ash disposal practices.
Zinc	Air pollution due to fugitive zinc dust, water pollution containing residues, disposal of solid and hazardous waste.

Box 1.1: The Singrauli Region: Legacy of Unsustainable Economic Development

Located about 1000 km southeast of Delhi, the Singrauli region was, until the early 1960s, a relatively isolated rural and economically under-developed region. Today Singrauli's landscape is dominated by massive open-cast coal mines (producing 50 million tons pa and with enough reserves to triple the region's current production), six thermal power stations with operating capacity of 7,800 MW, installed hydro power capacity of 400 MW, a significant number of large public and private energy-dependent heavy industries (including cement, aluminum (150,000 tons per annum), caustic soda (33,000 tons per annum), and a number of other small and medium ancillaries), power transmission towers, belching smokestacks, quarries, and a number of crowded, congested and polluted urban centers ("Boom Town Effect"). The region is a remarkable example of what almost half a century of induced development without adequate social and environmental safeguards can produce: a much needed economic productivity and corresponding severe social depravation/fragmentation and environmental degradation.

On the socio-economic side, the region's development has brought disruption to the traditional way of life (including impact on indigenous forest-based people), several waves of displacement (300,000 people by some accounts, due mainly to the formation of the Gobind Ballabh Pant Sagar lake), unfulfilled promises of equitable and permanent resettlement (some families have been relocated several times), lack of adequate infrastructure and public amenities, as well as lack of economic opportunities. Air and water pollution are of great concern, especially the presence of mercury in the food chain and other chemicals and heavy metals in water resources.

In 1991, the Government of India (GoI) designated the region as a critically polluted zone, for which a comprehensive remedial Action Plan has to be develop and implemented. Environmental management plans were designed for each of the local industries, with a significant level of monitoring and oversights from environment and local authorities.

An apex Committee was set up headed by a Chairman, Special Area Development Authority (SADA), for regular review of progress. Recent evaluation shows that the situation has improved to some extent with respect to compliance with the Action Plan recommendations. The Committee further recommended better monitoring of air and water quality in the long term that includes undertaking an assessment of the carrying capacity of the region, adopting cleaner coal technologies, and environmental capacity building.

(Source: Bose and Leitmann, 1996)

1.7 To achieve and sustain the targeted 8–10 percent rate of economic growth, India has to invest massively to expand and upgrade its overstretched infrastructure, particularly power supply and roads, which are currently regarded as major bottlenecks to growth by investors (World Bank, 2004c).

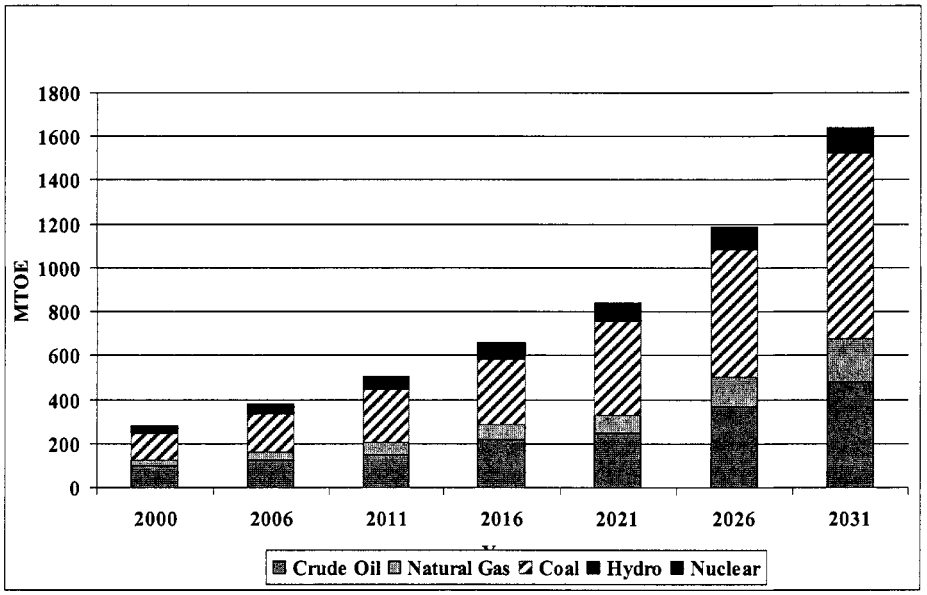
1.8 The capacity deficit in **the power sector** is already resulting in severe power shortages as peak load shortages reach 12 percent (Ministry of Power (MoP), 2005). According to the 2001 census, over 50 percent of households lacked access to basic lighting (Registrar General and Census Commissioner, 2001). Furthermore, the *per capita* electricity consumption in 2003 was still relatively low at 435 kWh, against 1,400 kWh in China, 2,400 kWh world average and 13,000 kWh in the USA (IEA, 2005). Considering that the Government of India (GoI) aims at universal access to electricity by 2012 and the need to improve power supply to industrial and urban consumers, sizeable additions to generation, transmission and distribution (T&D) capacity are urgently required, along with efficiency improvements, demand-side management, and reduction of substantial losses in the T&D networks. To fill the significant demand–supply gap, India plans to nearly *double* its current installed capacity (115,500 MW as of January 31, 2005) by 2012 through pubic and private power generation companies (MoP 2005). It is expected that about 30,000 MW will be added during the Tenth Plan (MoP, 2005).

1.9 This scale of development cannot happen without significant environmental implications. The power sector is associated with a host of environmental externalities, manifested at different spatial levels — local, regional and global (Box 1.2). The key environmental concern for India is linked to heavy reliance on coal, which accounts for about 60 percent of power generation. While special efforts are made by GoI to increase the share of hydro and other alternative energy sources, coal is likely to remain the dominant fuel for many years (Figure 1.2) given India's vast indigenous coal resources.

Box 1.2: Key Environmental Issues in the Power Sector

- Coal-based thermal power has significant environmental effects due to gaseous emissions, particulate matter, fly ash and bottom ash, and water effluents. The impact is further exacerbated by the high ash content of India's coal and aging facilities lacking modern pollution control;
- One of the most serious effects of coal power stations is land requirement for ash disposal and percolation of hazardous elements into ground water through ash disposal in ash ponds. Due to enormous quantity of ash content in India's coal, approximately 1 acre per MW of installed thermal capacity is required for ash disposal. If this trend continues, by the year 2014–2015, 1000 square km of land, equal to the size of the Honk Kong area, or 1 square meter per person, should be required for ash disposal only;
- Coal-based generation is also the main contributor to India's carbon dioxide emissions, linked to changes in global climate;
- Hydropower projects, while having no air emissions or ash, might put stress on ecological systems by accelerating soil erosion and changing water flows, and lead to resettlement of populations with the resulting change in land use pattern; and
- Transmission projects can disrupt sensitive ecological areas on the way and alter land use patterns.

Figure 1.2: Forced Hydro, Nuclear, and Gas Scenario (Fuel Mix Year Wise)



Source: Planning Commission (2005a)

1.10 Major investments are required in the roads and highways sector to support India's continued economic growth, improve connectivity, and assist with reducing poverty. The density of India's road network relative to its land area is 768 km/1,000 square km, which is similar to the United States of America (USA; 657), and far higher than China (141) or Brazil (203). However, the road density relative to the population is only 2.53 km/1,000 people, higher than China (1.08) and lower than Brazil (10.28), United Kingdom (UK; 6.33), or USA (22.68). In addition, although roads carry almost 85 percent of the country's passenger traffic and about 65 percent of its freight, most highways in India are narrow, congested and have poor surface quality. Therefore, GoI is implementing a multi-phase program, with an allocation of US$ 13.5 million (Rs. 59,490 crores) in the Tenth Plan period (2002–2007) for the central sector roads. A major part of this allocation is for improvement and capacity augmentation of 65,569 km of national highways. Similarly, the States are expanding and upgrading State highways (comprising 16 percent of the total State roads network while carrying about 40 percent of the total traffic), which often are main bottlenecks to the economic development agenda of States. These massive construction programs are transforming India's landscape, and the scale of environmental impacts is yet to be appreciated (Box 1.3).

Box 1.3: Environmental Impacts in the Highways Sector

The range of applicable environment issues and impacts is most often accentuated and should be prioritized in the context of their geographical location. Key ***direct impacts*** include: *soil degradation,* i.e. loss of top soil and reduction in the productive capacity of soil covered by road; *water resources modifications* and *drainage* related issues leading to changes in surface and ground water flows and water quality degradation; *air quality changes* due to air pollution caused by construction equipment and traffic related emissions; *noise pollution* due to increase in vehicles and construction and maintenance activity. *Biodiversity* may be directly impacted due to habitat loss, fragmentation, alteration, and restriction in animal migration paths. *Cultural heritage,* which has a high social value, is impacted by the potential damage to sites and the remains of archaeological, historical, and religious structures.

Furthermore, there are multiple linkages throughout the entire process of accelerated highway construction activities that may lead to significant ***indirect impacts***, often affecting larger geographical areas. The examples of such impacts due to forward linkages include the degradation of surface water quality by the erosion of land cleared as a result of a new road; increased deforestation of an area; increase in poaching in eco-sensitive zones during the construction works; changes in land use and settlement patterns due to migrations from rural areas, as a result of improved transportation facilities and better access, leading to growth of urban and semi-urban townships that are unplanned with fragmented infrastructure facilities. *Road safety* continues to be a major concern, especially for the poor groups who suffer from transport-related accidents because they use vulnerable modes such as walking and non-motorized transport. The main impacts from backward linkages related to mining and quarrying. For example, airborne silica generated from stone crushers is found to increase morbidity and mortality from silicosis. Dust from these operations affects local communities often located in close proximity to such facilities.

(Source: information collected by the study)

1.11 Mirroring the country's size and diversity, the environmental risks and problems are wide-ranging. India's dual features of a low and middle income economy are reflected in the environmental damage estimates. These damages are still dominated by "poverty-related" risks, such as lack of sanitation and indoor air pollution in rural areas. The share of "growth-related" risks manifested by the deteriorating urban environment, industrial waste, and chemical pollution is however increasing (Hughes and others 2001; Lvovsky 2001). In the second decade of strong economic performance, India is making and planning future massive

investments in infrastructure, urban development, and industrialization. Not surprisingly, the issues of managing the environmental impacts associated with rapid growth are coming to the forefront of public attention[6].

Environmental Implications: Opportunities

1.12 Importantly, economic growth also brings in resources, technologies, policies, capacity, and *public demand* for improved environmental performance and quality.

1.13 One of the most comprehensive measures of a country's environmental performance is the *Environmental Sustainability Index (ESI)*, which is a composite of 21 indicators that cover five broad categories of environmental pressure.[7] Cross-country data reveal a strong positive relationship between the ESI and per capita gross domestic product (GDP), measured at purchasing power parity (PPP) exchange rate, shown by Figure 1.3[8]. India appears to have a considerably better ESI score than China or Pakistan; nevertheless, and as all large South Asian countries, it has a lower ESI score than its level of income forecasts (indicated by its position that falls below the regression line).

1.14 Cross-country analysis also shows that that there is a positive relationship between the rise in per capita income and national enforcement of environmental regulations — even at relatively low-income levels (Dasgupta and others 2001). A critical mediation role of environmental policies and institutions, which mature with growth in the growth–environmental outcomes relationship, is illustrated by the diagram below (Figure 1.4).

1.15 India has a strong environment policy, legislative framework and well-established institutions at the national and State level. The Constitution of India, through Articles 48(a) and 51(a)(g), has articulated the responsibilities of the central government and citizens for ensuring protection and improvement of the environment, and Article 21 includes the right to live in a pollution free environment. The institutional capacity of regulatory agencies, such as the Central and State Pollution Control Boards (CPCB/SPCB), has improved over time and there are documented successes in addressing certain problems (some of which will be illustrated in this report). Among the many recent initiatives of the MoEF and CPCB are the establishment of a task force to oversee the implementation of environmental action plans for 17 categories of the highly polluting sectors; developing, the Chapter on Corporate Responsibility for Environment Protection jointly with the industry; and conducting an

[6] This has been a message from extensive discussions and consultations during the study when representatives of all three sectors unanimously conveyed that "the environment" for making investments and doing business today is very different from that 10–15 years ago, on account of much larger sensitivities over environmental and social issues.

[7] ESI is a collaborative venture of the Yale Center of Environmental Law and Policy and CIESIN at Columbia University. The subcomponents measure performance in the following areas: (i) environmental systems, (ii) reducing environmental stresses, (iii) reducing human vulnerability to environmental stresses, (iv) societal and institutional capacity to respond to environmental challenges, (v) global stewardship (Esty and others 2005). As with any other aggregate index, the ESI is not without its shortcomings. Given the lack of information in many countries, the rankings are an approximation of sustainability, based on an aggregation of a wide array of indicators. A major weakness of the ESI is that it gives equal weight to all its sub-components and so assumes that environmental stresses are uniform in their impact across countries.

[8] The regression of ESI (Esty and others 2005) on per capita GDP (World Bank, 2006c) is controlled for population density, primary school enrolment rate (World Bank, 2006c), civil liberty and political rights index (www.freedomhouse.org), and democracy index (Jaggers and Marshall, 2000). The regression includes 128 countries/observations, and only some of the countries are selected for presentation here.

inventory hazardous waste generation, including identification of old and abandoned contaminated sites, which could be potentially used to develop a national plan for cleaning up of contaminated areas.

Figure 1.3: Environmental Sustainability Index and Income

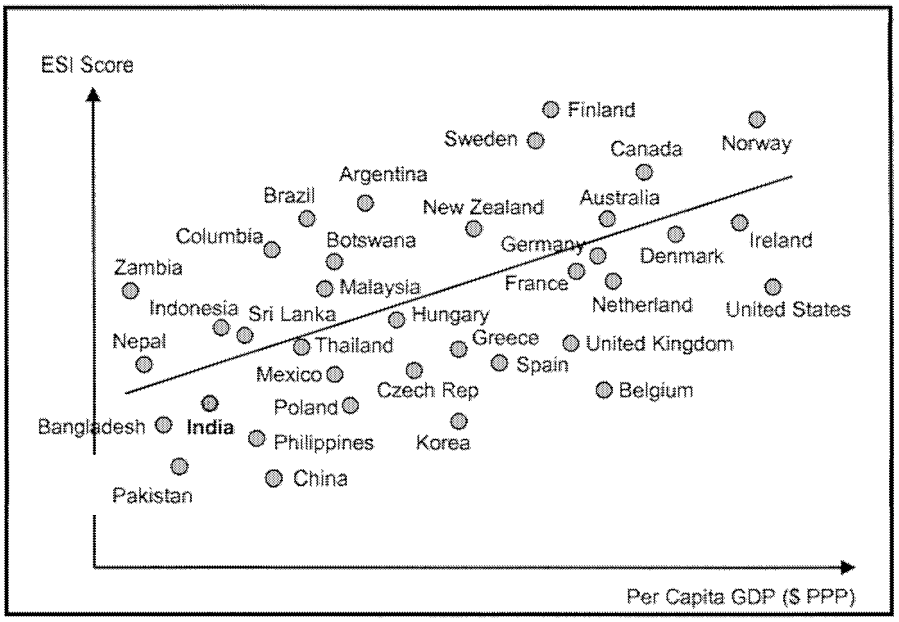
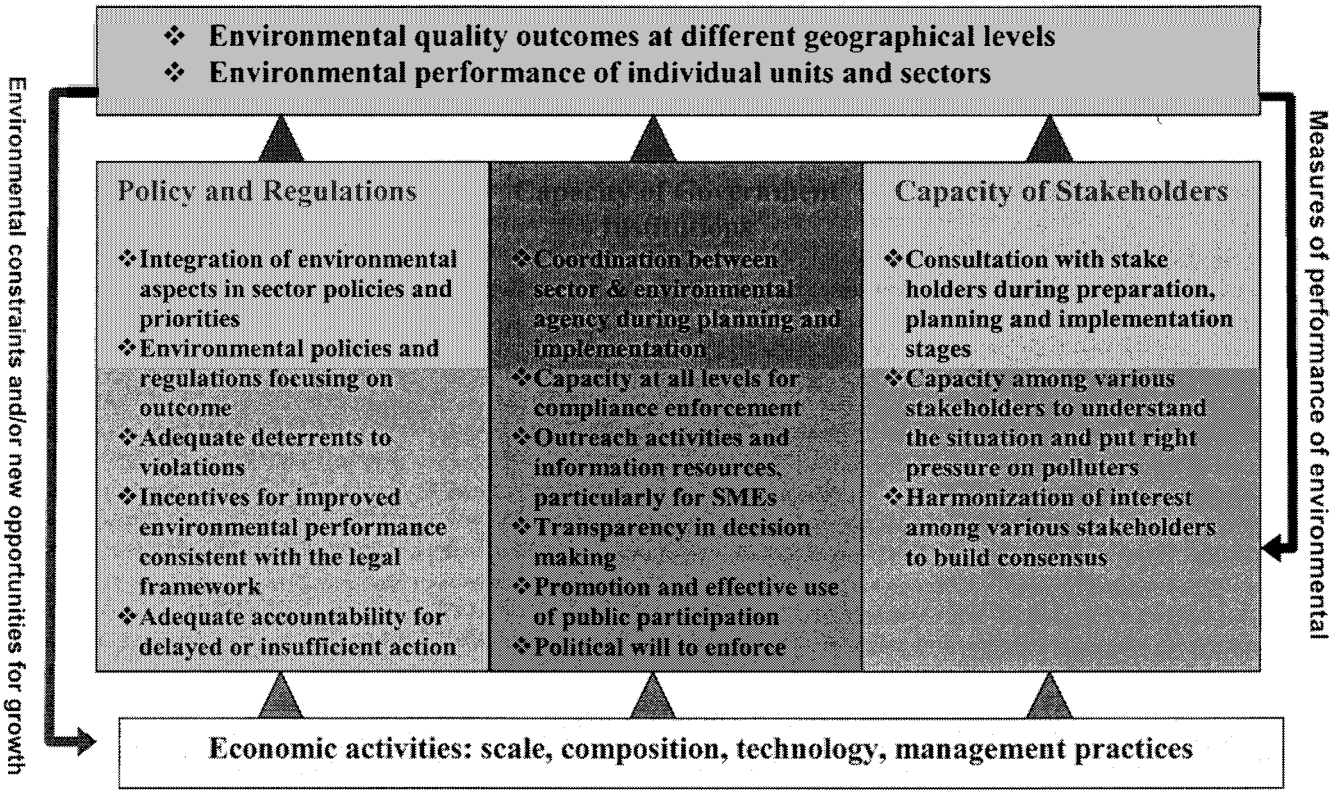


Figure 1.4: Linkages Between Economic Activity, Environmental Outcomes, and Institutions



1.16 Importantly, over the past years there has been an increase in *public demand for better environmental quality* from the growing and increasingly assertive urban middle class, as demonstrated by drastic measures to improve air quality in Delhi, which now has the largest compressed natural gas-driven public bus fleet[9] in the world. All over the world, starting with industrialized countries in 1960s, it is *this broad-based constituency for change,* created by both the environmental impacts of unmanaged growth and economic well-being brought by growth, which has transformed environmental management from an obscure science into a backbone of modern government structures. This public demand is being increasingly matched by voluntary environmental performance obligations and initiatives from the large-scale Indian industry asserting a prominent role in the global market.

Environmental Implications: The Need for More Effective Action

1.17 Despite an enabling legislation and progress in institutional development, keeping up with the environmental challenges of rapid urban growth, industrialization, and infrastructure development (including provision of adequate environmental infrastructure to booming urban areas) has proved difficult. This is evident from the persistent high levels of environmental pollution in excess of national ambient standards (Figures 1.5 and 1.6). In 2003, of the nearly 3,000 ambient water quality observations, the levels of prevalent organic pollution, measured as biochemical oxygen demand (BOD), exceeded water quality criteria for Class A water bodies in over 1,000 cases. The country-wide ambient air quality monitoring carried out by CPCB at 201 monitoring stations revealed that National Ambient Air Quality Standards (NAAQS) for respirable suspended particulate matter (RSPM), the main air pollutant of public health concern, were violated at most of the monitoring stations (MoEF, 2005). The estimated annual economic cost of damage to public health from increased air pollution, based on RSPM measurements for 50 cities with the total population of 110 million, reached US$ 3 billion (Rs.15,000 crores) in 2004[10].

[9] For more information on the Delhi case, see Greenspan and others 2004; World Bank 2005; and Narain and Greenspan 2004.

[10] Estimates based on the conventional benefit-transfer methods. For details, see Lvovsky and others 2000; World Bank, 2005.

Figure 1.5: Biochemical Oxygen Demand (BOD), Major Rivers, 2004

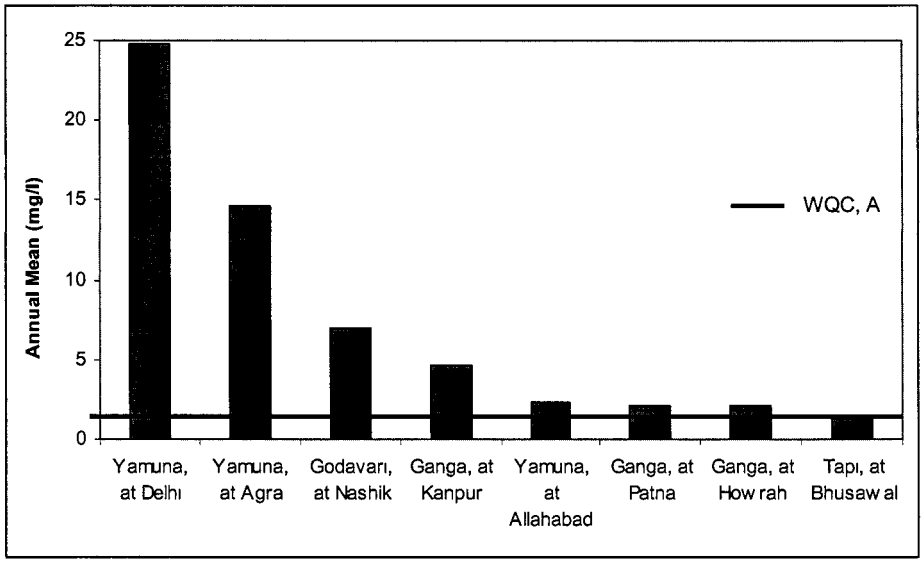
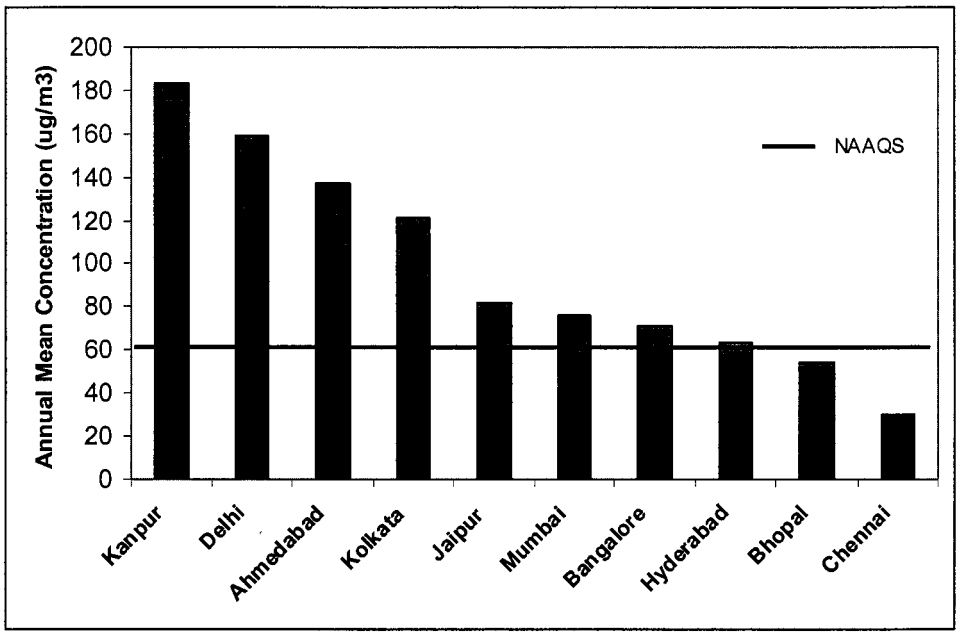


Figure 1.6: Respirable Suspended Particulate Matter, Residential Areas, 2004



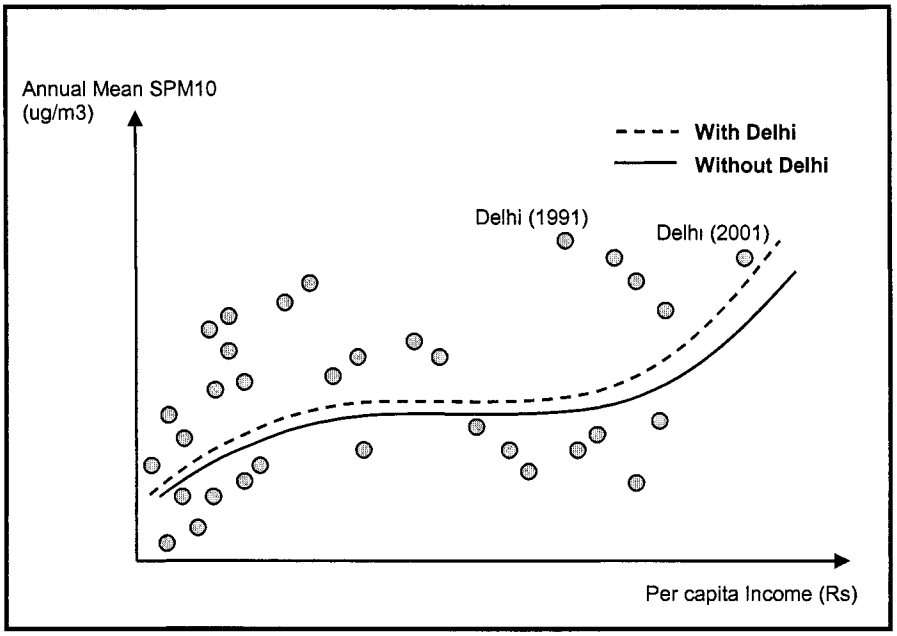
Source: CPCB website, http://www.cpcb.nic.in/

1.18 Empirical evidence from India on the impact of growth on environmental quality outcomes, based on a limited analysis across States, shows that the country is still recording an upward trend in the levels of major air pollutants — suspended particulate matter less than 10 microns (SPM-10) and nitrogen oxides (NOx) — in urban areas (Figure 1.7).[11] It must be

[11] A state-level panel regression analysis was carried out between 1991 and 2001. Air quality levels are averages for all monitored cities in a state, combining measurement in both industrial and residential areas (source: http://www.cpcb.nic.in). State GDP data are obtained from www.indiastat.com. The analysis controls for institutional

stressed that this finding is subject to caveats and *cannot* be generalized for other environmental quality/pollution indicators, an analysis of which was not done because of the lack of suitable data.

Figure 1.7: Economic Performance and Urban Air Pollution in India's States



Source: Analysis undertaken by the study

1.19 Importantly, there is also an indication (albeit not yet sufficient to change the overall trend) of a decrease in SPM-10 pollution in Delhi, evident from Figure 1.8 and recorded by other studies[12]. Air quality data and trends highlight an emerging phenomenon of *conflicting trends* for different categories of cities, similar to that experienced by many other countries, and reflecting the complex forces behind the impact of growth on environmental action and outcome. Figure 1.9 reveals opposite trends among SPM-10 levels for a group of largest cities and a group of smaller cities over the past ten years (1995–2004).[13] While the levels of air pollution decreased in the former group, they have been increasing for the latter group. Currently, the *average* SPM-10 exposure level in the group of smaller cities is slightly higher than that for the larger cities group. This is a result of greater attention and effort given to

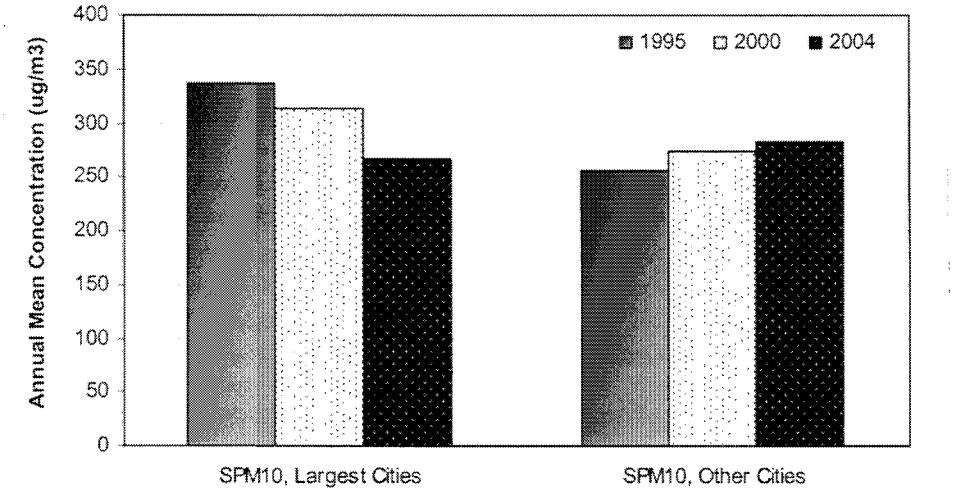
(Kochhar and others 2006) and demographic factors (World Bank, 2006c). Regressions without Delhi, which could be considered an outlier, and with Delhi showed similar qualitative results, illustrated on the Figure. Dropping some other higher income-higher air pollution cities did not change qualitative results either. To control for possible effect of winter heating in northern cities, same regressions were run for average SPM-10 levels during the months of April-November only and yielded similar qualitative results. Regressions for NOx also showed similar qualitative results. However, SO2 levels, which are very low, do not show a statistically significant relationship with an income.

[12] See, for example, World Bank (2005) for a detailed analysis of air quality trends in five major India cities.

[13] Largest cities are Delhi, Mumbai, Calcutta, Ahmedabad, and Hyderabad. Other cities are Bhopal, Nagpur, Jaipur, Kanpur, Jalandhar, Indore, Faridabad, Surat, and Vishakhapatnam. CPCB data on annual average SPM-10 concentrations for these cities is used to calculate population-weighted average exposure for each group. (Source: CPCB website, http://www.cpcb.nic.in).

arresting air pollution in larger cities, which again demonstrates the power of environmental action and the huge unfinished agenda in making this action happen across the country.

Figure 1.8: India SPM-10 Trends, Largest and Other Cities, 1995–2004



1.20 The immense unfinished agenda underpins the growing dissatisfaction with environmental management in India by an increasingly vocal, active, and impatient "green" constituency. Some successes notwithstanding, the situation on the ground is considered inadequate by a wide range of stakeholders. Much of the problem is credited to weak implementation of laws and regulations.

1.21 A demand for change and more effective action is building up and being recognized, albeit to a varying degree, at all levels and by all players. The GoI's Five-year Plan emphasizes that the national development agenda should prioritize environment conservation at the central, State and local levels by suitably "modifying unsustainable activities" and understanding cumulative cross-sectoral effects. The recently approved National Environment Policy (NEP) 2006, by the MoEF acknowledges the deficiencies in the existing policy and institutional framework, such as continued environmental degradation and delays with reviewing development projects. The NEP calls for wide ranging regulatory reforms, exemplified by an earlier initiated review of the EIA clearance procedures, commissioned by the MoEF and particularly highlights the need for: *"identifying and integrating environmental concerns in relevant sectoral and cross-sectoral policies through review and consultation..."* (MoEF, 2006).

The Study

1.22 This *country environmental analysis* was conceived with the objective of helping strengthen the environmental policy *implementation* framework to meet the challenges of a rapidly growing and extraordinary diverse India's economy. The focus was on identifying and proposing ways to address major gaps in the existing institutional arrangements, regulations and incentives for good *environmental compliance and performance*. In support

of NEP priorities, significant attention was paid to developing, *jointly with multi-sectoral government counterparts and by way of a broad-based consultative process,* actionable and commonly shared recommendations to influence sectoral and cross-sectoral decision making towards more environmentally sustainable development practices.

1.23 . Given the size and diversity of India's economy and geography and the resulting multiplicity of environment development pressure points, the study approach was to exercise strategic selectivity. The scope of work developed through extensive consultations with MoEF (the main counterpart) and multiple other stakeholders allowed to focus on priority issues, not covered by, and complementary to, recent or on-going work (for example, a review of the environmental assessment (EA) process that the MoEF previously commissioned and which was nearing its completion at the time this study was about to start). It also allowed drawing of wide-ranging conclusions relevant to a variety of stakeholders despite the limited breadth and depth of the analysis that was possible within a reasonable timeframe.

1.24 The study specifically focused on the following issues:

- Promoting greater accountability, transparency, and public participation in environmental management
- Strengthening monitoring and enforcement of policies and regulations
- Addressing capacity needs of environmental institutions
- Improving institutional incentives for integrating sectoral and environmental priorities.

1.25 The assessment covered the three select sectors that are among the key drivers of growth: industry, power (including three distinct sub-sectors: coal-based power generation, hydro power generation, and transmission), and highways. Together, these sectors represent a variety of environmental issues, such as water and air pollution, and hazardous wastes, as well as impacts on water flows, land and vulnerable ecosystems. They also represent diverse sources of environmental impact — large *point sources* (power plants, large industry), small *areas-based sources* (small-scale industry), and *linear sources* (transmission lines, highways — requiring different regulatory and enforcement approaches. These sectors anticipate substantial scale-up of future investments from both private and public sources. The analytical framework used by this study was a combination of sector-wide reviews, based on secondary data of issues, policies, regulations and institutions, with several case studies of implementation experiences and specific projects in the selected sectors (Box 1.4 for case studies description). The case studies covering seven States of India, aimed at gaining a deeper understanding of the obstacles (as well as contributors) to better environmental compliance and performance on the ground. The case studies involved primary data collection and consultations with local stakeholders. Selective reviews of international experience in environmental management were also conducted. The findings from all reviews and case studies were integrated to leverage support for corrective actions building on a growing number of good practices in India and internationally.

Box 1.4: Case Studies of Implementation Experience

Industrial Sector

The two case studies are:

- Naroda Industrial Estate in Gujarat (established in 1964 near Ahmadabad by the Gujarat Industrial Development as the first industrial estate in the state); and
- Patancheru Industrial Estate in Andhra Pradesh (established in the year 1975 in Medak district of Andhra Pradesh about 15 km from Hyderabad)

These two are representative of the nature of challenges in environmental management, types and capacities of industrial sector and factors responsible for varying degree of environmental management. While Naroda represents an industrial area that has predominance of small and medium scale chemical industries, Patancheru symbolizes an area that has a mixed type of industries many of which are in the chemical or pharmaceutical sector.

Power Sector

The three case studies covered three power sub-sectors and included:

- Dadri Coal Power Plant in Uttar Pradesh of the National Thermal Power Corporation (NTPC). It is in commercial operation since 1995, and was the first NTPC plant in the country using beneficiated coal;
- Koldam Hydro Power Project in Himachal Pradesh, also by NTPC. Construction started in 2001 and is expected to be completed by 2008–09. Located on river Satluj, this run-off river project is a good example of the new generation of hydro-power projects in India; and
- Dhauliganga-Bareily 400 KV DC transmission line crossing Uttar Pradesh and Uttaranchal, commissioned by the PowerGrid Corporation of India Limited (PowerGrid) and the National Hydro Power Corporation (NHPC). This is an example of the transmission project completed (over the period 2000–2005) in some of the most difficult and demanding social and environmental conditions (passing through different ecological areas — mountains, valleys, forests, rivers and wildlife sanctuary, as well as multiple villages and towns).

Highways Sector

The two case studies selected were:

- Western Transport Corridor project (NH-4) in the state of *Karnataka,* 259 km, funded by Asian Development Bank (ADB); and
- Jaipur-Kishangarh part of NH-8 in *Rajasthan*, 93 km, implemented on Build Operate Transfer basis.

These two road sections are part of the prestigious National Highway Development Project (NHDP) proposed to augment the major traffic corridors (North–South and East–West) and the projects are being implemented by the National Highway Authority of India (NHAI). The issues however, are similar and can be applied to State Highway Projects where the implementing agency is the state Public Works Department.

(Source: Data collected during the study)

Consultative Process

1.26 A central feature throughout this country environmental analysis was the extensive consultations and dialogue with the concerned sectors and players. Roundtable discussions, meetings, brainstorming events and workshops took place in December 2004, April 2005 (launch workshop), June 2005, August 2005, December 2005 (multi-sectoral consultation workshop on early findings) and July–August 2006 (consultation on the draft final report). A major public (non-governmental organization; NGO) consultation workshop was held in July 2006, followed by meetings with government representatives of all the sectors involved (environment, industry, power, and highways). In addition, several consultations were held by study consultants during the summer of 2005 with local stakeholders at the project sites selected as case studies. The draft report was also posted on the Internet for broader public review and feedback during June–July 2006.

1.27 The consultative process has been particularly important because from the onset the main added value of this exercise was in reconciling different perspectives and helping to develop a *commonly shared* vision by all principal stakeholders on the way forward. As articulated in the following chapter, the lack of trust and constructive dialogue among opposing stakeholders is becoming a key constraint to environmental management reforms. This study was guided by the related "process-oriented" outcomes set at the beginning of the process, namely:

- A deepened understanding shared by various stakeholders of institutional development needs for improved good environmental management, performance and compliance;
- An agreement on the actions to be taken by all concerned stakeholders to improve environmental outcomes; and
- A better informed and accelerated process of change and regulatory reforms towards a more effective regulation and improved performance.

Road Map to the Report

1.28 This report is a synthesis of all background reviews and studies. This introductory chapter is followed by three chapters presenting, respectively, the main findings and recommendations under the three "pillars" of successful environmental management which emerged as a priority for India. These are: consensus building through effective multi-stakeholder dialogue and public participation (Chapter 2); facilitating compliance through a balanced combination of a credible threat, encouragement and knowledge (Chapter 3), and aligning sectoral incentives with national environmental objectives (Chapter 4). A summary of key messages and conclusions, with implications for various stakeholders, is given in Chapter 5.

II. Building National Consensus through Effective Dialogue and Public Participation

2.1 Environmental management is influenced by, and has impacts on, a great variety of institutional stakeholders, as shown in Figure 2.1. The individual action of each of these stakeholders has consequences for other stakeholders, and their relationships for environmental management are intrinsically inter-connected. Economists would call this relationship a significant asymmetry between the benefits and costs, as the (private) benefits from using an environmental resource are often captured by one group (e.g. an industry using assimilative capacity of a river or an air-shed) while the (social) costs are borne by the others (e.g. nearby community exposed to the pollution). This asymmetry is the fundamental cause of potential conflict between multiple stakeholders, necessitating both government interventions to correct for market failure and create an effective dialogue for developing an appropriate set of interventions (i.e. a set of environmental policies and regulatory mechanisms) which will be broadly accepted, widely honored, and thus sufficiently enforced. A history of environmental management worldwide shows that effective environmental enforcement requires *informed* consensus on environmental management objectives and policies that is based on a *good understanding of the shared roles and responsibilities* of all players, including the regulator, the regulated community (developers and polluters) and the affected community (general public).

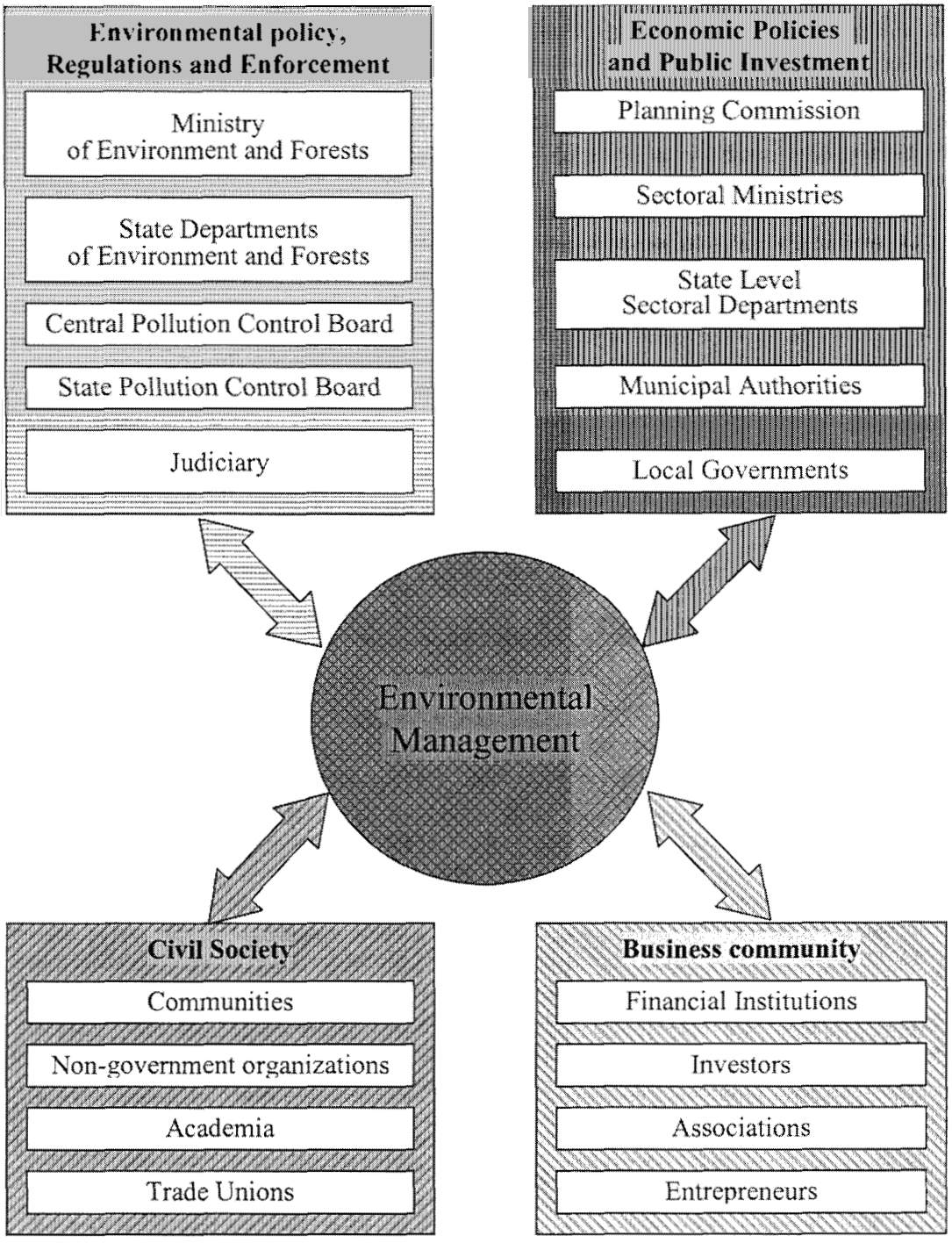
The Challenge: Multiple Stakeholders with Opposing Views

2.2 Currently, several factors undermine the effectiveness of multi-stakeholder dialogue over environmental issues in India and the ability of all stakeholders to move forward towards a more sustainable mode of development. The problems of multi-stakeholder dialogue arise from societal assumptions that different stakeholders have of each other based on experience and perceptions.

2.3 On one end of the spectrum of societal assumptions, some believe that involving the public will merely lead to inefficiencies in the decision making process and not add substantially to the quality of decisions that need to be made; that the opposition voiced by NGOs is uncompromising and merely reflects a "Not In My Back Yard" (NIMBY) syndrome; and that some NGOs do not represent the real interests of the affected community — who are often largely illiterate and uninformed — and merely promote their own agenda. Some also believe that governments are meant to represent the "public interest" and therefore should be entrusted with the inherent authority to decide what is in the public interest.

2.4 On the opposite end, there is a public distrust and an assumption that the government is always under the influence of developers and therefore any decision that the government makes is automatically suspect. Regulatory agencies are often criticized for spending most of its attention on addressing the concerns of the developers and investors and giving little attention to concerns of the affected community. Rather than trying to understand the possible impacts of a proposed development on the affected communities, more time is spent in identifying regulatory obstacles that are viewed as impeding construction of the proposed project.

Figure 2.1: Key Stakeholders of Environmental Management in India



2.5 This public mistrust has been reinforced by previous developments over large and controversial projects, particularly those where the resettlement of communities was proposed to make way for alternative land uses, such as hydroelectric dams or highways projects. The communities to be resettled were often not informed or consulted until after key decisions were made. Conflict over land use or environmental impacts due to infrastructure or industrial projects have been one of the most contentious public policy issues for economic

growth in both industrialized and developing countries alike (see Box 2.1 for some examples from India). This is of particular concern to the growth agenda in India due to its high population density, enormous needs for new investments, and the mounting environmental activism.

The Alternative: Confrontation and Public Interest Litigation

2.6 There are numerous examples of environmental or land use related disputes over various development projects in India that have led to a dramatic confrontation between the communities and the developers, eventually inflicting the heavy cost on both sides and highlighting the need for a different approach. (See Box 2.1).

Box 2.1: Conflict over Development Projects in India: Examples Collected by Sector Reviews

A highway project in Karnataka. The Western Transport Corridor bisected the village community of Aimangala in Karnataka. Due to the lack of prior consultation with the community, the need of villagers for a pedestrian underpass to provide safe crossing was not considered. The local people resorted to public confrontation, including laying siege to engineers and consultants, to demand an underpass to connect both sides of the village. At this stage, however, the redesign would have meant significant additional costs, time and demolition of work already done; and was thus declined. The consequence was an unsafe and accident prone road, which could have been avoided if there had been early consultation with the community during the design of the project. This lesson demonstrated the value of public consultation and has been taken up by National Highways Authority of India (NHAI) in more recent projects.
(Source: Information collected during study consultations).

An industrial facility in Kerala. In the Birla Enterprise case of the early 1980s, citizens in Kerala raised concerns over pollution in the Chaliyar River from the Gwalior Rayon manufacturing mill. The state government called a meeting between the community, factory management, and Kerala state pollution control board and several agreements for improved environmental management at the factory were reached. Despite this, after several years no action was taken by the factory and citizens were forced to launch a prolonged protest against the factory and government to compel the implementation of the earlier agreement. This citizen's action led to the government forming a committee to study the pollution caused by the factory and recommend corrective solutions. The factory management eventually decided to close down the polluting plant.
(Source: Centre for Science and Environment, 1982; 2005)

2.7 More recently, citizens have also been increasingly resorting to public interest litigation to resolve environmental disputes. In 1985, the Doon Valley case marked a watershed event in the establishment of public interest litigation in India. Claining the government's inability to control the environmental destruction from quarrying, citizens in Uttar Pradesh turned to public interest litigation to protect their rights and the environment. In a landmark decision, the Supreme Court ordered the closure of 53 of the 60 limestone quarries in Doon Valley because the facilities had adversely affected local water springs and the health of nearby residents.[14]

2.8 With this decision, the Supreme Court established the important legal precedent of the "right to a healthy environment" and created a new avenue for addressing environmental

[14] http://www.unu.edu/unupress/unupbooks/80a03e/80A03E0n.htm

concerns through public interest litigation and the courts. In most countries, the courts have been viewed as a last resort in resolving environmental conflicts. In India, however, it has often become the first resort because of the perceived inabilities or lack of political will of the regulatory agencies to enforce environmental laws and regulations. This has resulted in an increasing number of court directives that have established new environmental policies and implementation requirements for both the public and private sectors (Table 2.1).

Table 2.1 Summary of Selected Public Interest Litigations and Court Directives

Case	Court Directive
Ratlam Municipality v/s Vardhichand – AIR 1980 SC 1622	The municipality was directed to construct toilets and remove filth from an open drain irrespective of financial constraints.
M.C. Mehta v/s Union of India & Others – AIR 1988 SC 1037	The authorities were directed to stop the operation of tanneries causing pollution in river Ganga.
M.C. Mehta v/s Union of India & Others – AIR 1987 SC 1086	The Court held that the enterprise engaged in hazardous or dangerous activity owes an absolute duty to the community to ensure that harm is avoided to anyone on account of hazardous nature of activity undertaken by such enterprise.
M.C. Mehta v/s Union of India & Others – 1997 (11) SCC 312	Directed the Government to constitute an authority for regulating and control of ground water management.
M.C. Mehta v/s Kamal Nath – 1997(1) SCC 388	Relying on Public Trust Doctrine, the Court ordered that it extends to natural resources such as rivers, forests, etc.; directed for recovery of damages who caused damage to the environment.
Vellore Citizens Welfare Forum v/s Union of India – 1996(5) SCC 647	Directed the polluter to pay the cost for remediation of the damaged environment as part of the process of sustainable development, polluter pays principle and precautionary principle.
S. Jagannath V/s Union of India – AIR 1997 SC 811	Directed shrimp culture industry to close its activities in view of the ecologically fragile coastal area and adverse effect on the environment because of its activities.
Rural Litigation & Entitlement Kendra v/s State of Uttar Pradesh – AIR 1987 SC 359	Directed the mining industry to stop the mining activities in the forest area of Doon Valley.
B.L. Wadhera v/s Union of India – AIR 1996 SC 2969	Directed the municipality of Delhi to remove garbage from various parts in the city of Delhi.
M. C. Mehta v/s Union of India & Others 1997(11) SCC 327	Directed the authorities for closure/shifting/relocation of hazardous and noxious industries outside the territory of Delhi which were operating in violation of the Master Plan.
M.C. Mehta v/s Union of India & Others 1997(3) SCC 715	Directed the industries to stop construction activity within 1 km from the lakes for the preservation of tourism and upheld the concept of sustainable development and precautionary principle.
M.C. Mehta v/s Union of India & Others 1986(2) SCC 176	Observed to set up separate environment courts to deal with environmental disputes.

(Source: the Supreme Court of India website, http://supremecourtofindia.nic.in)

2.9 While the judiciary is an essential institutional player in environmental management, it is also widely and increasingly recognized that the Executive Branch agencies must urgently find new ways to reduce public conflicts and improve the dialogue among multiple stakeholders over environmental issues. Box 2.2 provides one useful example of such an action by an environmental ministry.

Box 2.2: Government's Response to Growing Public Confrontation: Thailand

Thailand's rapid industrialization and urbanization has led to significant environmental challenges and community opposition. As a result, environmental conflicts have been front-page news in Thailand. Infrastructure projects were frequently delayed due to disputes between project developers and communities who were not consulted in the early stage of the development process. In 2002, the State of the Environment Report developed by Ministry of Natural Resources and Environment (MoNRE) concluded, "Lack of participation from local community and all stakeholders in the early stage of the mega development projects has led to conflicts and protests that have not been settled yet."

Consequently, a Cabinet Resolution was issued in Thailand mandating that all Thai agencies establish dispute resolution programs. Beginning in 2002, MoNRE, the Thai courts, and civil society leaders worked to develop an environmental dispute prevention and resolution policy. As a first step, MoNRE conducted stakeholder consultations to identify the major challenges, priority issues, and training needs in implementing this policy.

Based on these consultations, MoNRE piloted a training program for a core group of mediators, including government officials, civil society leaders, judges, and police officers. In addition, an Environmental Dispute Prevention and Resolution Center was established as a center of excellence to support skills development among governmental and civil society leaders, expand the roster of capable mediators, and foster greater cooperation between the government and civil society. Since 1992, MoNRE has expanded the dispute resolution training program, established formal mediator qualifications, and begun creating a network of local mediators in the regions capable of handling actual disputes.

Source: US-Asia Environmental Partnership, http://www.usaep.org/accomplishments/thailand.htm

The Way Forward: From Stand-Off to Constructive Dialogue

2.10 One of the priority challenges (and possibly the top priority) facing India today with respect to environmental management is to break the vicious circle of distrust and accusations of blame among opposing stakeholders. Fortunately, good practice examples from India and elsewhere and the three sector reviews provide encouraging examples of how to successfully *promote and harness public participation.*

2.11 Large corporations in India have responded to the situation by adopting corporate environmental and social policies and working with the communities. For example, the case studies of the Koldam Hydropower Plant by the National Thermal Power Corporation (NTPC) and the transmission line by PowerGrid showed that significant attention was given to meaningful community consultations. In the Koldam project, a Village Development Advisory Committee was created and Public Information Centers were established in three locations to enhance public involvement and communication between the community and NTPC. The constitution of Village Development Advisory Committees and Public Information Centers are being adopted in all NTPC projects, resulting in more intensive interactions with community representatives and affected people. There are emerging "good practice" example of community consultation in State road projects. *The challenge is to scale up good practices and social corporate responsibility initiatives, still practiced by a few, to a widely held social norm.*

The Benefits of Public Participation

2.12 The Public Trust Doctrine is one of the foundations on which democratic societies were built and it rests on the principle that certain resources such as air, water, and forests are of such great importance to society as a whole that the government is entrusted with protecting these resources for the enjoyment of everyone. Effective public participation increases the credibility of government institutions responsible for executing the public trust by ensuring an open and inclusive decision-making process. When civil society and other stakeholders feel they have an understanding and voice in the decision-making process, public confidence in the fairness of the decision increases. Conversely, lack of meaningful public participation creates perceptions of undue influence or corruption that project proponents or industry may have over the regulatory system and regulators. Effectively involving the public in the decision-making process helps to promote the accountability of government agencies and ensure that they are acting in the public interest. Participatory democracy also requires the involvement of all levels of government and society, including formal and informal institutions. There are a growing number of examples from developing countries reflecting the recognition of the value of strengthening the instruments and institutions for multi-stakeholder consultation and public participation in environmental management (Box 2.3).

Box 2.3: A Framework for Public Participation in the Phillipines

As part of its environmental management strategy, the Laguna Lake Development Authority (LLDA) in ***the Philippines*** recognized that a broad based, multi-sector, multi-stakeholder approach was necessary to protect and restore the environment. The LLDA organized River Basin Councils for each of the river systems flowing into the lake and involved local governments, fishermen, farmers, industry, NGOs, schools, churches, and other community stakeholders in the governance structure. The River Basin Councils established a volunteer army for clean up activities, developed public awareness and educational campaigns, organized training programs for local governments, and shared best practices with other communities.
Source: LLDA website, http://www.llda.gov.ph/

2.13 Public participation is also beneficial in informing and improving the environmental and policy choices made, because communities are often important repositories for knowledge of the local conditions and historical trends underlying environmental problems such as groundwater contamination or soil erosion. Local stakeholders can provide site specific knowledge and identify potential solutions that project proponents or environmental managers may have overlooked in the early stages. This was highlighted by stakeholder consultations at project sites, particularly the power sector case studies, and is further illustrated in Box 2.4.

Box 2.4: Listening to Communities with Site Specific Knowledge

The case of Chipko Andolan in Uttar Pradesh showed how a constructive and action oriented movement by the villagers prevented the destruction of a nearby community forest. Because of the concerns and protests raised by women from the village, an expert committee was established to evaluate the potential environmental impacts from the proposed felling of trees by developers. The committee concurred with the women and recommended that, due to the highly sensitive nature of the watershed, felling of trees be banned to allow for regeneration of the forest.

(Source: CSE, 1982)

2.14 The importance of public participation in the Environmental Impact Assessment (EIA) process is probably most widely recognized, for several reasons. First, public involvement in the EIA process provides an opportunity for the community to identify and understand the economic, environmental, and social impacts of a proposed project. Second, public participation can help identify potential adverse impacts — indirect, cumulative, and long term impacts — and potential mitigation alternatives that might otherwise not have been considered. Third, it increases public awareness of the project and identifies opportunities for community ownership such as citizen monitoring of the project. Public participation cannot totally eliminate conflict over a proposed project. However, it can reduce conflict by bringing all the public concerns and suggestions to the surface. Finally, public participation can foster a more effective integration of economic, social and environmental concerns regarding infrastructure development. When the public is allowed to receive information about a proposed project, provide input, and most importantly, feel that their input is taken seriously, public participation can yield better decisions and long term results.

Overcoming Difficulties of Public Participation

2.15 When the public is not given an appropriate venue to be heard, it will create its own venue to protest using PIL or other showing of discontent. The highways sector review highlights the case of Golden Quadrilateral where citizens blocked the highway to demand underpasses, overpasses, and cattle crossings.[15] Furthermore, instruments of public participation should be meaningful, and not perceived as a mere formality.

2.16 Unfortunately, public hearings which are the most common form of public participation and the main instrument currently used in India are often perceived by NGOs as a staged event that appears to involve citizens when in reality the decision has already been made by those in power. On the other hand, project proponents frequently perceive public hearings as an unavoidable evil where NGOs and civil society voice unfounded fears for the purpose of delaying or stopping a project. Regulatory agencies are caught in the middle, trying to balance the concerns of both the public and project proponent in hearings that are either not well attended or highly contentious. Acting upon the limited effectiveness of the current public hearing process and following an extensive public review and debate, the MoEF issued a new *EIA Notification* on 14th September 2006 (Box 2.5).

2.17 An important factor that influences effective public participation is the *ability* of citizens to engage in the public participation process. Making the project proponent or development agency responsible for providing the details of a proposed project in the local language during the public hearing so that participants can understand the information provided is necessary and already being practiced in India. It is sometimes not enough. Citizens, particularly from remote rural areas or tribal communities, may have difficulty in understanding the ramifications of a proposed project, because they lack the information or do not have the technical knowledge to appreciate the scientific and technical information presented. They may not understand the costs and benefits of the management options or how those options could affect their own interests over time. Or, they may not be able to call upon the same sophisticated planning tools or economic analyses that others may use to put forward a convincing case. For example, when considering the expansion of a highway, some

[15] *Information collected during study consultations*

residents may have misgivings about the potential environmental impacts, but this may pale in comparison to the potential services that the road could bring to the community and the State's larger economy.

Box 2.5: Notification for the Re-Engineering of the EIA Process in India

The new EIA Notification, issued in September 2006, requires public consultation for all Category A and Category B1 projects, with some exception (such as project activities in industrial estates or parks, expansion of roads and highways, building projects and category B2 projects). The public consultation comprises of two components — the public hearing at the site for ascertaining concerns of local affected people; and written response from other concerned persons having a plausible stake in the environmental aspects of the project or activities. A summary of the EIA report will be made available on the website and the draft EIA report may be made available to persons who request it within 60 days. The public consultation will be conducted by the SPCB or Union Territorial Pollution Control Committee (UTPCC) within 60 days of a request by the applicant. If the SPCB or UTPCC fails to conduct the public hearing within the prescribed time period, the Expert Appraisal Committee (EAC) or SEAC will appoint another public agency to conduct the hearing. After completion of the public consultation, the applicant is required to address all the material environmental concerns expressed in the public consultation and make appropriate changes in the draft EIA and Environmental Management Plan. Procedures for conduct of public consultation are prescribed in Appendix to the Notification.

It is noteworthy, that 'public hearing" has been replaced with "public consultation" in the new notification, perhaps reflecting a paradigm shift in the expected outcome of the process. The *public hearing* process as part of EIA was presented as an opportunity for potentially affected communities to flag their concerns. In the new Notification, "*public consultation*" aims to force project proponents to proactively seek the views of affected communities at various stages of project development and integrate these concerns in the design. The other major change is the timing of getting views of affected parties, which is a prerequisite for the final EIA document and not as an annexure to EIA document after it is completed, as is usually done. A number of other process changes aim to address the alleged lacunae in the current system of public hearing.

It would be useful to establish a good evaluation mechanism to collect credible data on whether the new procedures once implemented will be able to improve the effectiveness of public consultation .

Source: EIA Notification 14 September 2006, Ministry of Environment and Forests, New Delhi

2.18 Another difficulty is that not all affected stakeholders are equally well-positioned to express their views. For example, in many projects, tribal communities who may be the most impacted by a proposed project are not involved either from their inability or lack of willingness to attend a public hearing. Barriers of distance, language, literacy, and connectivity — all the factors of particular relevance to India due to the remoteness of many habitations, multiple languages, and significant illiterate population — can also prevent full participation. There is also a growing trend among developers to distinguish between public stakeholders which include affected communities and NGOs, and to limit the consultation/public hearing process to the affected community only. While these two groups of public stakeholders are not necessarily the same, and some NGOs may have other interests than those of the communities, many affected local communities have relied on NGOs to assist them with technical information and public advocacy skills they do not possess. Therefore, in ensuring the effectiveness and sustainability of the public consultation process in the long-term, the focus should be on building capacity of community institutions to better understand and participate in the decision-making process rather than on limiting access to consultation forums.

Innovations in stakeholder involvement and public participation, tried by many countries, help to enhance the effectiveness of the more traditional methods, such as public hearing and public comment period. These innovations include application of community-based management approaches, conducting trainings to build civil society capacity, holding public hearings in a more interactive manner, and increasing access through technology enhancements. The main instruments of public participation are summarized in Table 2.2 and, while the public hearing process is the most commonly used, examples of each type of participation, at least on a pilot basis, can be found in India. For example, the Village Development Advisory Committees are a key instrument used by the NTPC to actively involve the public in community development activities.

Table 2.2: Instruments of Public Participation

Document Review	Community members and other stakeholders increase their capacity to participate by reviewing background materials presented in a language and at a technical level they can understand. Having access to documents and reports also increases the accountability of decision-makers and the perceived legitimacy of the decision-making process.
Informational Meetings	Informational meetings provide basic information to the public about proposed projects, such as where or when a road or power plant will be build and its potential benefits and impacts. Informal meetings when conducted, early on in the process can help minimize initial public fears, identify local concerns to be addressed in the design of the project, and develop trust and communication with local communities.
Public Hearings	Public hearings are meant to provide a formal opportunity for the public to voice their opinions and concerns on a proposed project, law, or environmental policy. Public hearings are often viewed as ineffective and lacking meaningful public participation. In some countries, government agencies have trained facilitators to preside over public hearings to improve the dialogue between the regulator, project proponent, and the public.
Advisory Committees	Advisory committees allow for greater participation of key stakeholders that is more in depth, continuous, and policy oriented. There is a distinction between citizen advisory committees, which consist of a diverse representation from civil society and expert advisory committees which usually bring together scientific or technical experts. Citizen advisory committees are intended to serve more as the voice of the larger public.
Public Involvement Volunteers	Public involvement volunteers are people from the community who are enlisted to assist an agency in developing and implementing a public involvement program. They can be specially trained to speak about the public participation process or proposed project. The volunteers help the agency to better understand the community concerns and improve the public hearing process.
Community Based Environment Management	Through community based environmental management, multiple stakeholders come together to develop and share solutions to local environmental problems via consensus-based approaches that integrate environmental, economic and social objectives. This approach encourages voluntarily and collaborative actions by all stakeholders — the government, citizens, and industry — for solutions that ensure both environmental protection and economic growth.

(Source: Information collected during the study)

Involving Citizens in Monitoring and Enforcement

2.19 A very important public participation tool is involving the public in environmental compliance and enforcement through citizen monitoring. Citizen monitoring can be a very effective mechanism to help support the implementation of an agency's environmental management responsibilities, particularly in States with limited resources. A process for longer engagement with the public beyond the planning stage of a development project is needed to ensure that the public's interests are protected through project implementation and

compliance. Successful examples of citizen monitoring can be found both in India and internationally (see Box 2.6).

Box 2.6: Examples of Citizen Involvement in Monitoring and Oversight

Under the Green India program, Development Alternatives is working in 78 cities in India on community based monitoring of PM, SO, and NOx parameters with air quality kits provided to local students and local NGOs. The data from these kits are shared with CPCB which validate the data collected and it is also used by the cities to develop city level action plans. Similarly, the Banwasi Sewa Ashram citizen monitoring project, supported by the CPCB, invites polluting industries to discuss initiatives they have taken for mitigation and control. *(Source: consultations during the study)*

In the Philippines, the concept of multi-partite monitoring has been introduced. Under this approach a monitoring team consisting of representatives from the Department of Environment and Natural Resources, the project proponent, NGOs, and local community residents may jointly undertake compliance monitoring of a licensed facility. The Philippines Department of Environment and Natural Resources is creating Regional Community Advisory and Monitoring Committees in each regional office which will involve NGOs and the private sector in all phases of EIA including compliance monitoring. *(Source: International Network for Environmental Compliance and Enforcement website, http://www.inece.org/)*

In the United States, citizen monitoring has been used to help support regulatory agencies in environmental management. In Baltimore, Maryland, the U.S. Environmental Protection Agency and the Maryland Department of Environment established a Community Environmental Partnership to monitor air quality in the city. Under this partnership program, the federal, state, and local governments worked side by side with businesses, community leaders, and NGOs to assess air pollution threats from 125 industrial, commercial, and waste facilities in the city. The members of the partnership reviewed a Toxic Release Inventory report on local chemical releases in the area and met with scientific experts. Partnership members then agreed upon a risk-based air pollutant screening approach to identify which chemicals that were being emitted posed the greatest health risks to the community. Based on these screenings, the partnership developed risk based priorities and an action plan to improve air quality in the area. By building the capacity of the community to assess pollutant risk calculations enabled them to better understand the air quality risks and to measure air quality improvements. *(Source: USEPA website, http://www.epa.gov/)*

2.20 Citizen monitoring and oversight might also involve reviews or "report cards" of agency or industry performance to ensure compliance with laws and policies. For this to be truly effective, an enforcing mechanism either from a voluntary agreement between the regulatory, industry and citizens or legal accountability is necessary to ensure compliance. For example, Local Area Environment Groups that are used by the SPCBs for monitoring purposes were created by the initiative of the Supreme Court Monitoring Committee on Hazardous Wastes. And of course, the ultimate form of citizen monitoring and supervision is the use of public interest litigation.

The Importance of the Right to Information

2.21 Public information is the foundation of a modern society. To be an effective participant of the decision making process it is necessary to know what decision is being made, why it is being made, and who is responsible. Access to environmental information enables the public to make informed personal choices about problems that may affect their well being and that of their children. It promotes improved environmental performance by the industry and a better performance of government institutions by empowering the public to hold the government and industry *accountable* for their performance and decisions (Box 2.7).

Box 2.7: The Impact of the Right to Information on Environmental Performance in the United States

The United States passed the Emergency Planning and Community Right-to-Know Act (EPCRA) to inform communities and citizens of chemical hazards in their communities. Under the Act, businesses are required to report the locations and quantities of chemicals stored on-site to state and local governments, and to annually collect data on releases and transfers of certain toxic chemicals and make the data available to the public in the Toxics Release Inventory (TRI). The US Congress later passed the Pollution Prevention Act which expanded the scope of TRI to include additional data on waste management and source reduction activities by industries. The goal of TRI is to empower citizens through information to hold companies and governments accountable on how toxic chemicals are managed. The information has led companies to improve their chemical management practices and governments to improve environmental enforcement since the TRI data is made public and is used as a public indicator to measure environmental performance.

(Source: USEPA website, http://www.epa.gov/)

2.22 The Right To Information Act (RTIA; 2005) is the result of a long fought campaign by civil society organizations in India, dating back to 1984 when the deadly methyl isocyanate gas released from the Union Carbide plant in Bhopal killed approximately 3,800 people and left several thousands with permanent or partial disabilities. The significance and the need for the law cannot be over emphasized. The Right to Information Act will operationalize the fundamental right to information; establish mechanisms to facilitate citizen's access to information; promote transparency and accountability in the government; reduce vulnerabilities for corruption in public office; and empower public participation in the governance of decisions that will impact public health and environment. The RTIA gives citizens the right to know and shape decisions that affect their own and their children's lives.

2.23 The adoption of the Act has important far reaching implications for public participation nationwide. While the Indian Constitution does not explicitly provide for right to information, the Supreme Court, through its various judgments, has interpreted this right to be originating from Article 19(1)(a) which states that "all citizens shall have the right to freedom of speech and expression". In addition, nine States of India had already adopted their own right to information legislation, viz. Assam, Delhi, Goa, Jammu & Kashmir, Karnataka, Maharashtra, Madhya Pradesh, Rajasthan and Tamil Nadu.

2.24 The next task is to ensure its use on a wide scale and effectively, in terms of clarifying procedures and ensuring capacity of public agencies to meet the requirements of the Act. It is important to widely disseminate policy guidelines on what type of information is covered under the Act. In addition, the procedural guidelines should detail the required specificity for the information requested, turn around times for complying with requests, etc. There is also an emerging need to assess the budget implications for government agencies of complying with the Act and plan additional expenditure in advance.

2.25 To facilitate the implementation of the RTIA, the MoEF launched the Information and Facilitation Counter (IFC), in December 2005. The IFC, being run by the Center for Environmental Education, will provide a range of services and assistance to users, including general information on MoEF; guidance for meeting officials; clearance status of projects (impact assessment, forest clearance, pollution clearance, industrial clearance, genetic engineering clearance); assistance on application procedures; interface with nominated nodal

officers of various divisions of MoEF. In the near future, a service for receiving and forwarding applications/queries under the RTIA will also be started, including the provision of document photocopies for a prescribed fee.

2.26 Ideally, the public should have access to the same environmental information as the decision maker. The four major types of environmental information for which public access should be provided are:

1) *Information about day-to-day environmental quality*, such as urban air quality, which helps people decide whether to take certain protective measures to lessen environmental impacts on their health;
2) *Information about long term environmental trends*, such as the quality of a watershed, which helps people to better understand the environmental consequences of unsustainable development;
3) *Information about pollution and violations from industrial facilities*, which empowers NGOs, communities, investors, and consumers to demand for greater compliance and responsible environmental stewardship; and
4) *Information about emergency situations and risks*, which enables people to protect themselves during events, such as a natural disaster or chemical explosion at an industrial plant.

Making Public Participation Work

2.27 In India, as in any democratic society, people hold the power to shape public opinion and government policy. As the economic situation improves, in India as in any other economy, an increasing number of people place a greater value on environmental quality and are able to voice their demands more aggressively. Strengthening opportunities for *effective* public consultation and participatory decision-making can play a critical role in avoiding conflicts between the citizens and developers, thereby improving both the physical environment for future generations and the business environment for investors. Several important steps can be taken in this direction.

2.28 **Improve Communication and Trust Among Stakeholders.** As more countries have incorporated public participation requirements in their EIA process, they have learned that involving the public late in the design of the project can cost money and time and breed mistrust from the public. Building trust between the government and stakeholders, which is a crucial component of any effective public participation process, will require commitment and time. Some communities and NGOs that had an adverse relationship with government agencies in the past still exist. However, trust can be enhanced by: (i) meeting with the community early in the decision-making process and throughout the project cycle; (ii) clearly responding to community concerns and explaining what actions would be taken to address their concerns; (iii) maintaining a credible presence in the community through the regional offices; (iv) openly sharing relevant information with the community; (v) involving key stakeholders in data gathering and decision making; (vi) linking with respected members of the community, such as religious leaders; and (vii) ensuring that channels of communication are always open.

2.29 **Maximize the Effectiveness of the RTIA.** The RTIA is a very powerful tool and should be optimally used. It is important to widely disseminate policy guidelines on what

type of information the public can have access to, as well as the procedural guidelines regarding requests for information, such as required specificity for information requested, processing or copying fees, turnaround times for complying with requests. Government agencies should also take timely steps to ensure that adequate resources are allocated to effectively handle the requests under the RTIA and should be trained on the legal requirements and procedural guidelines.

2.30 **Provide Credible and Easily Accessible Information.** Public access to information is a pre-requisite for effective consultation with and engagement of the public. Given the technological advances, regulatory agencies should ensure that the public has electronic access to EIA documents, documentation of consultations, environment monitoring data, status reports on pending actions by implementing agencies on clearance conditions and consent management, and submission of public comments. Credible sources of information can also help in resolving conflicts with stakeholders and the public. Often credibility of data is questioned and verification of scientific data by an independent outside source can improve credibility. An Environmental Information System (ENVIS) program by the MoEF and the creation of the IFC, serving as an independent repository for information and expertise, are important steps towards improving trust in the decision-making process. It is necessary to quickly develop these steps to ensure easy access to this information across India, and not only in elite locations. This information could be disseminated through kiosks at various locations, such as local college campuses, public schools, libraries, community centers. However, compiling and ensuring access to data will not be sufficient, because the public needs to know what is being done with the information and agencies should also develop ways to publicly report on the actions taken. The proposed review of the ENVIS programme is a timely opportunity to strengthen these and other aspects.

2.31 **Develop Public Participation Strategies in the Context of the Specific Development Project and With Sensitivity to the Local Situation.** For any development project, all stakeholders need to be identified and a systematic strategy prepared for outreach. The strategy would depend on the impacts identified and the sensitivities and social fabric of the local people so that a balanced consultation can be carried out. If the public feels that they are not given a meaningful opportunity to be heard, public hearings can backfire and greater conflicts can arise. It is also important to distinguish between a public "hearing", which is a one time event and a "consultation" (the term used in the draft new EA notification), which is a continuous process of listening and responding to the community concerns. Independent and informal institutions should also be utilized in the public hearing and public consultation process, but it is necessary that they interface with government agencies.

2.32 **Build Government Agency Capacity for More Effective Public Consultation and Participatory Decision Making.** Government staff involved in stakeholder and public participation efforts need special training to sensitize them to the role of the public, the value and use of public consultation activities, and how to conduct them properly. The skills and techniques required include: listening and communication, community outreach and partnering, issue identification and management, consensus building, vision building, negotiation and alternative dispute resolution. If training is not available, agencies should consider employing outside facilitators to help conduct public hearings. In addition, agencies should be trained in the policy and procedural guidelines for implementation of the RTIA, and take actions to build capacity in a timely manner to effectively respond to the requirements of the Act. Sectoral agencies should develop their own communication strategies or community engagement manuals from which staff could be trained. For

example, in Australia, the Department of Roads has developed a simple user friendly community engagement manual that is used in-house to provide clear direction for road engineers in public consultation.

2.33 **Broaden the Understanding and Strengthen the Capacity of Local Governments in Environmental Decision Making.** Devolving more environmental responsibilities to local governments is an important aspect of the decentralization process initiated in the 73rd and 74th Constitutional Amendments. Local tiers of government have assumed increasing responsibilities for management of solid waste, providing clean drinking water, and controlling sources of urban air pollution. However, the process of devolution to the lowest levels of government has not been fully accomplished. It is critical to further involve local governments, particularly at the village council level, in the environmental decision-making process, especially when it comes to public participation. The relationship between national, State and local levels of government in the EIA process should also not be overlooked since State and local governments will play an increasingly active role in how the EIA is implemented. The increased emphasis on local control of environmental problems, however, raises new needs to strengthen the capacity of local governments to respond and manage these problems.

2.34 **Sensitize Sectoral Agencies and Developers to the Need for Meaningful Public Participation.** While there are good practice examples of government agencies, public corporations and private companies taking and working with communities seriously, many are still trying to bypass it and turn a public consultation, even when required, into a formality. It is important to facilitate information sharing, using examples of specific projects, on the benefits of true public participation to the ultimate outcomes and sustainability of development projects (and the likely cost of not taking it seriously), as well as provide practical guidelines and tools for facilitating effective public consultation and participation.

2.35 **Build Civil Society Institutions and Capacity to Understand.** Capacity building initiatives should target civil society institutions as well as the government. Even if given the opportunity to participate, community stakeholders may lack the capacity to become involved in as meaningful a way as they desire. This was cited as one of the main barriers to effective dialogue with the public by both regulators and developers. Greater effort should be made to improve the capacity of civil society to better understand the issues, including the impacts and benefits of available alternatives, and effectively engage in public participation forums. This could be achieved through training programs tailored to meet the needs of civil society organizations and NGOs.

2.36 **Exercise a *Participatory* Action Planning Process.** Environmental action planning has proven to be an effective mechanism in providing meaningful public input into the decision-making process and resolving environmental problems, particularly at the local level. The SPCBs or municipal/local government authorities could encourage and facilitate the development of *participatory* local environmental action plans in priority geographic areas or priority sectors. The preparation of the plans should bring together representatives from all stakeholders — State and local government, industry, NGOs, civil society, academic, and scientific organizations. Working together, stakeholders should define clearly articulated environmental goals shared by the community at large, identify performance targets or indicators to be measured over specified time periods, and outline a comprehensive set of action items including regulatory measures, voluntary initiatives, information

management measures, community initiatives, and educational activities to involve all stakeholders.

2.37 In conclusion, successful public participation must be strategically and carefully planned and executed as part of a long term environmental management program of educating and building capacity of all stakeholders involved. And, while government officials must still rely on the more traditional forms of public participation, such as public hearings, introducing innovative and more interactive approaches can increase the level of public awareness, involvement, and ownership of environmental problems and solutions.

III. Enabling Compliance in the Regulatory Environment

Building on a Sound Foundation

3.1 By any benchmark, India has an extensive environmental management system with a comprehensive set of environmental laws (Box 3.1), specific statutory mandates, regulatory instruments, and institutional frameworks to implement and enforce environmental policy objectives. Environmental legislation is on the national list. However, it involves a shared responsibility between the center and the States, with the central government having responsibility for policy and regulatory formulations and the State governments for ensuring implementation and enforcement of national policies and laws. At the central level, the Ministry of Environment and Forests (MoEF) and the Central Pollution Control Board (CPCB) are the nodal agencies responsible for environmental compliance and enforcement. Similarly at the State level, the State government Departments of Environment and Forest (DoE/DoF) and the State Pollution Control Boards (SPCB) are the designated agencies to perform these functions.

3.2 The main environmental management instruments include: (i) an *Environmental Impact Assessment* (EIA) system to regulate the siting and approval of large projects that requires the project proponent to prepare an EIA that is subject to *public hearing* near the project site and then is appraised and decided upon at the central level by the MoEF; (ii) *Forestry Clearances* that are processed separately by the DoF at both the State and central government levels, and require the project proponent to deposit the compensatory afforestation payment and the net present value (NPV) of diverted forest land with the DoF to obtain clearance; and (iii) the *Consent to Establish* (CTE) and *Consent to Operate* (CTO), issued by SPCBs, that regulate the establishment and operation of facilities at the State level. These vital "command and control" instruments are the principle foundations of any environmental regulatory system, and are supplemented with economic instruments and other incentives, such as matching grants for the common effluent treatment plants (CETP) or "green awards" introduced by most SPCBs.

3.3 Another key institutional actor for environmental enforcement in India is the judiciary that many would argue have filled a vacuum left by the regulatory agencies. Over the past decade, the courts have stepped in and developed a system of environmental jurisprudence, resulting in significant new policy mandates for both the public and private sectors. The legislation also requires updating to address new environmental risks.

3.4 Despite this strong policy and institutional framework, environmental degradation continues in many areas and public dissatisfaction with the situation grows. Sector reviews and case studies, lessons of international experience, and extensive consultation with various stakeholders during the course of this country environmental analysis highlighted three overarching themes (further discussed in this chapter), where actions must be taken to reverse the current trends: (i) aligning the regulatory framework with environmental pressures; (ii) strengthening the toolkit to promote environmental compliance; and (iii) matching regulatory capacity with regulatory mandates in a growing economy.

Box 3.1: Key Environmental Legislations in India — An Illustrative List

Policies

1992 Policy Statement on Abatement of Pollution
1992 National Conservation Strategy and Policy Statement on Environment and Development
1998 National Forest Policy
2002 Wildlife Conservation Strategy
2006 National Environment Policy

Environment Acts

1927 The Indian Forest Act
1972 The Indian Wildlife (Protection) Act (amended 1993)
1973 The Water (Prevention and Control of Pollution) Act (amended 1988)
1977 The Water (Prevention and Control of Pollution) Cess Act (amended 1992)
1980 The Forest (Conservation) Act (amended 1988)
1981 The Air (Prevention and Control of Pollution) Act (amended 1987)
1986 The Environment (Protection) Act (amended 1992)
1988 The Motor Vehicles Act
1991 The Public Liability Insurance Act (amended 1992)
1995 National Environment Tribunal Act
1996 National Environment Appellate Authority Act
2002 The Wild Life (Protection) Amendment Act T
2002 The Biological Diversity Act
2003 The Water (Prevention and Control of Pollution) Cess (Amendment) Act

Environment Rules

1986 The Environment (Protection) Rules
1989 Hazardous Wastes (Management and Handling) Rules
1990 Forest (Conservation) Rules (amended 1992)
1991 Chemical Accidents (Emergency Planning, Preparedness and Response) Rules
1998 The Bio-Medical Waste (Management and Handling) Rules
1999 The Recycled Plastics Manufacture and Usage (Amendment) Rules
2000 The Municipal Solid Wastes (Management and Handling) Rules
2000 The Hazardous Wastes (Management and Handling) Amendment Rules
2000 The Ozone Depleting Substances (Regulation and Control) Rules
2001 The Batteries (Management and Handling) Rules
2002 The Noise Pollution (Regulation and Control) (Amendment) Rules
2003 The Recycled Plastics Manufacture and Usage (Amendment) Rules
2003 Bio-Medical Waste (Management and Handling) (Amendment) Rules
2003 Forest (Conservation) Rules
2003 Draft Biological Diversity Rules

Environment Notifications

1994 Environmental Impact Assessment Notification 1994 (amended 2002)
1998 Constituting the Taj Trapezium Zone Pollution (Prevention and Control) Authority
1999 Fly Ash Notification

International Agreements to which India is a Signatory

1975 The Convention on International Trade in Endangered Species of flora and fauna (CITES)
1991 The Convention on Wetlands of International Importance (the Ram Sar Convention)
1992 The Framework Convention on Climate Change
1992 The Convention for Conservation of Biological Resources
1985 The Vienna Convention/Montreal Protocol on substances that deplete the ozone layer
1972 The Rio Declaration on Environment and Development and the Agenda 21

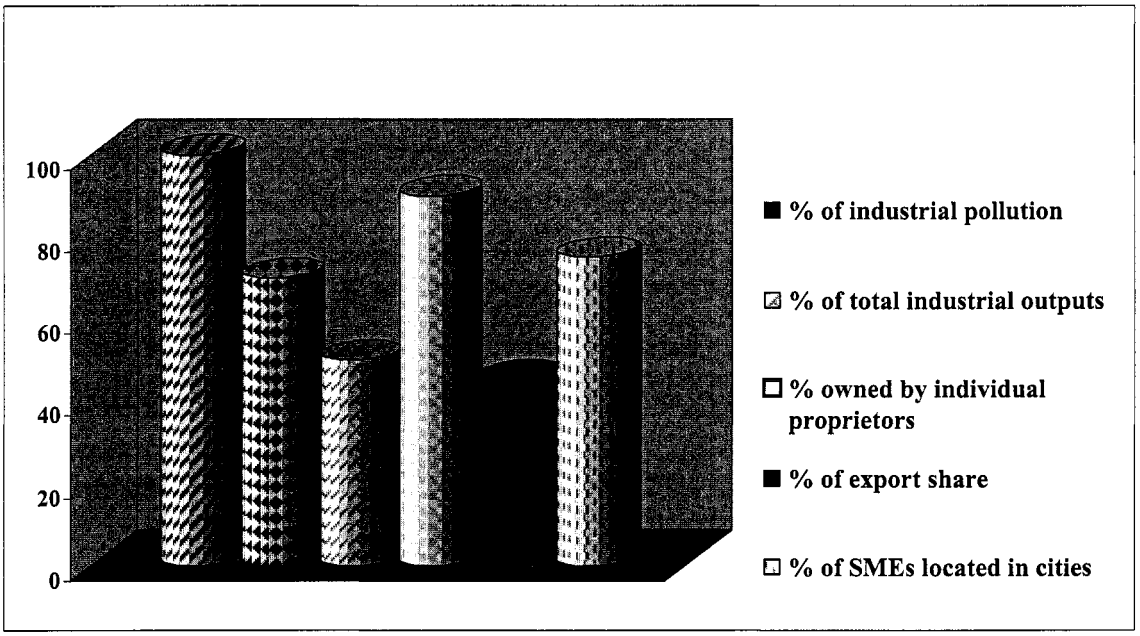
Aligning the Regulatory Framework with Environmental Pressures

3.5 One key conclusion of this country environmental analysis is that the current focus in applying environmental regulation does not match the scale and diversity of India's economy, with its multiple pollution sources, often outside the industrial sector, and is not responsive to changing priorities resulting from the country's accelerated growth. This necessitates (i) exploring new regulatory programs and approaches, targeting different pollution sources; and (ii) exercising greater flexibility in applying regulatory standards, supported by sound economic analysis.

Expanding the Scope of Regulation to Cover Diverse Pollution Sources

3.6 **The Importance of Small and Medium Scale Industries.** Environmental problems, particularly in the "brown" sector, such as industry, energy and infrastructure, and urban development, have received increased public attention with the rapid growth in the country's economy in recent years. The regulatory focus has been on controlling the large and visible polluters, mainly large industries and power plants; but continued monitoring and enforcement of these large polluters is required. However, SMEs totaling to more than 4.5 million units, account for about 40 percent of industrial output in terms of value and estimated to contribute approximately 70 percent of the total industrial pollution load[16] (Figure 3.1).

Figure 3:1: Importance of Small and Medium Scale Enterprises in India



3.7 The pollution generated from small scale industries is generally higher per unit of production than that of the corresponding large units partly because of the use of obsolete technologies and poor management practices, and partly because they do not come under the

[16] Source: MoEF website, http://www.envfor.nic.in/

orbit of regulatory authorities. In the past, many SMEs, particularly those set up before the start of deregulation in the 1990s, fell outside the jurisdiction of either the local industrial authority or the SPCB and continues to be a problem today. The State governments and the SPCBs generally have not paid much attention to the pollution generated by these because of: (i) the difficulties in monitoring these units; (ii) the relatively high costs of pollution abatement for small units compared with large units; and (iii) the possible adverse impact of enforcing the standards on the output and employment of these industries, which are, cumulatively, the second largest employer in the country after agriculture.

3.8 While many SPCBs have relatively good records regarding the performance of the highly polluting units in the large scale sectors, the monitoring and inventory of small-scale units in the category of highly polluting processes is very poor and incomplete. In part, the lack of interdepartmental coordination between the SPCBs and the field units of the National Sample Survey Organization (NSSO) and Development Commissioner for Small Scale Industries (DCSSI) may result in the existence of some highly polluting units in the various States, which are not reported to the SPCBs. For example, in Gujarat, a few years ago there were approximately 1,600 large and medium size industries and 17,000 small enterprises, but only about 5,000 CTOs had been issued. In some States not all industries fall under the purview of the pollution control laws and consequently there is no record of them at SPCBs. SMEs should give more attention to resources to monitor and control pollution, particularly among SME clusters located in degraded watersheds and airsheds that are in close proximity to (sometimes mixed within) residential areas.

3.9 **Growing Importance of Municipal Sources.** In addition to expanding the mix of regulated industries to include small scale units, it is also important to recognize that industry is not always the biggest contributor to pollution in many of the receiving bodies (such as a river, or air in a large city). Municipal and domestic sources of pollution often pose a greater risk to public health and the health of an ecosystem, due to the large volume of untreated sewerage and domestic waste. Hospital waste and air pollution from transport, garbage burning, and even dust from poorly paved roads are other examples of pollution sources that increasingly compromise the effectiveness of pollution control and environmental management efforts by large industries. Therefore, it is important to understand the proportionate impact of the currently regulated sources on the ambient environmental quality compared to other sources on an area-wide basis, and design regulatory programs that target all major contributors to pollution in the area.

3.10 **Need for Different Regulatory Programs and Approaches.** Expanding the focus on additional sources will definitely necessitate looking at different regulatory programs, processes, and approaches, because both the nature of pollution/environmental impact and the nature of response/enforcement of these sources will be different compared to industrial point sources. For example, monitoring the large number of SMEs using the same protocol as for large industries units would be time and cost prohibitive for the SPCBs, and threatening to close a city hospital because of environmental violations would not be a viable enforcement option. In addition, different monitoring approaches may need to be considered for public versus private sector entities. For public entities, both generation and regulation of pollution rests with government agencies, which reduces the effectiveness of the regulatory program (as evident from experience of developing/transition economies with significant public sector) when accountability to the public is limited. Involving citizens in the monitoring of State and municipal facilities would make the regulation of public entities more transparent and effective.

3.11 **Dealing with SMEs Would Require Special Regulatory Programs** that focus on SME clusters in degraded areas and provide a comprehensive package of credible enforcement efforts (sometimes, following tightened regulations if the area environmental conditions require so) and extensive compliance assistance (discussed in more detail below). As the first step, an inventory of operating SMEs in the area should be conducted to determine how many are covered under the consent management system and how many are operating illegally or without environmental oversight. Environmental awareness and technical assistance programs, which are being increasingly provided to SMEs, need to be complemented by simplified monitoring programs suitable for SMEs and financial assistance, all together amounting to an effective package. To make the task feasible, further progress in devolution of monitoring and enforcement authority to local offices of SPCB and greater involvement of the local government and citizens in monitoring and enforcement, with corresponding capacity building would be required.

3.12 Similarly, different approaches (vis-à-vis the focus on monitoring single large units) are needed to address the multitude and diversity of sources in urban areas and heavily industrialized regions. One way is to expand on *an area based environmental management approach*, which has been tried in India since 1991 by the CPCB and SPCBs through eight different programs, including action plans for critically polluted areas, programs for environmentally sensitive areas, and city level urban air action plans (Table 3.1). The earliest application of this approach occurred during a crisis situation in the Singrauli region, depicted in Box 1.1. CPCB and respective SPSBs have also developed and are monitoring the implementation of the environmental action plans for the 24 critically polluted areas.

3.13 An advantage of the area-based approach is that it allows for a scientifically driven assessment to prioritize among multiple pollution sources, a consensus based stakeholder process to establish environmental and community goals, and the integration of diverse management options to address the cumulative impact on the ecosystem or water/airshed. In practice, the area-based (or integrated) pollution management approach has had mixed success in India and its application in other countries also had varied outcomes depending on the objectives and mechanisms for implementation. A review of India's experience undertaken by this study highlights several lessons: (i) involve a wider range of stakeholders in such programs, particularly better define the role of affected communities in the monitoring process; (ii) establish adequate performance indicators, linked to environmental quality improvements in the area, and not just to implement certain measures by individual polluters; (iii) strengthen oversight of implementation and incentives for polluters to complete the actions speedily; and (iv) ensure greater integration of area-wise sources in the program, including both non-point and point sources, industry and other sources, etc.

3.14 Some of the most successful international examples on area-based management include those where an appropriate coordinating "area-based" authority was established with adequate powers, such as river/lake basin or coastal zone management agency (e.g. Laguna Lake Development Authority in Philippines), or city-level air quality councils (e.g. Mexico). It is important to learn from these lessons, to assess the realistic potential and improve the effectiveness of this tool within the institutional framework for environmental management in India. In India, this approach would be more effective by linking with the decentralization process and local government agenda, strengthening the authority of municipalities and regional development authorities, and enabling them to facilitate integration of multiple sectoral strategies and stakeholders.

Table 3.1: Summary of Area-Based Environmental Management and Planning Approaches in India	
Action Plans for critically polluted/problem areas	This is the major area-based program in India. To date, 24 critically polluted/problem areas have been identified by the Central Pollution Control Board (CPCB) in consultation with the concerned State Pollution Control Boards (SPCBs), for which action plans are in various stages of implementation.
Programs for environmentally sensitive areas	The Ministry of Environment and Forests (MoEF) have issued notifications prohibiting or restricting location of industries, mining operations and other development activities with environments impacts in five environmentally sensitive areas.
Eco-city Program	The Eco-City Program has been initiated by the CPCB for environmental improvement in selected small and medium towns. In the first phase, it has been launched in four towns.
City level Urban Air Action Plans	The CPCB has identified 53 non-attainment cities where the air quality exceeds the prescribed ambient standards. The concerned State governments and SPCBs are required to prepare action plans for air pollution reduction in these cities. Several measures have been undertaken in recent years in Delhi; and action plans have been submitted for 16 other cities.
Areas with industrial clusters	Under this program, eight areas of concern due to the clusters of polluting industries (mostly tanneries and foundries but also drugs and pharmaceutical manufacturing units, and clusters of coal mining and coal based power stations) have been subjected to rigorous monitoring and pollution control initiatives.
Area wise Zoning Atlas for the siting of industries	To delineate the areas that suitable for industrial siting and for classification of areas in different categories based on their existing environmental profiles, the program for preparation of District–wise Zoning Atlas has been taken up by the CPCB in collaboration with the SPCBs (with Gesellschaft for Technische Zusammenarbeit (GTZ) support). In the first phase, 19 districts were taken up for preparation of the zoning atlas.
Area wise assimilative capacity assessment	A pilot program for assessing area wise assimilative capacity and exploring the feasibility of setting location specific standards was undertaken by the CPCB in the river stretch in Rajamundri and in the Vizag air shed area, Andhra Pradesh.
Area wise carrying capacity studies	Studies were undertaken in five selected areas of the country to assess the area wise carrying capacity over time, to assist with spatial planning and decision making with respect to industrial growth and other development activities based on environmental considerations.

Source: review commissioned by the study

3.15 **Challenges of Monitoring Environmental Compliance by Linear Projects.** There is an ongoing and anticipated massive expansion in construction with new highways, roads and transmission lines, often going through ecologically sensitive areas. Many of the environmental impacts as well as monitoring and enforcement procedures are not clear for these projects in the current regulation.

3.16 The nature of these linear projects is such that they extend over multiple ecological, social and administrative boundaries giving rise to cross sectoral and cross boundary impacts. The multiple administrative and regulatory jurisdictions add to the management challenge. Furthermore, these projects are mostly implemented by a consortium of entities, such as different contractors working on different stretches of the same transport or transmission corridor with varying construction practices. Though supervision and compliance monitoring may be through the same government implementing agency, due to the linear expanse of these projects, there are separate project management units along the way resulting in varying management practices and priorities leading to varying degrees of compliance.

3.17 Regulatory monitoring is mandated by the Air and Water Act and is to be enforced and monitored by the SPCBs per standards set by the CPCB. However, there are ambiguities in the application of these Acts. For example, these Acts are mostly applicable to point sources of pollution, which for highways construction comprises hot mix plants, batching plants or crushers and related noise, and effluent discharge. In the highways sector, projects which have received environmental clearances based upon their initial environmental impact assessment, often receive little attention from regulatory agencies on post-clearance monitoring during operation. As a result impacts, such as soil degradation, water resources modifications, impacts on bio-diversity, wildlife, cultural heritage and other landscape distortions that were addressed through the EA clearance process, are not monitored. One possible approach to address this gap of post-clearance monitoring, which emerged during consultation with the highways sector, is to introduce auditing of implementation practices in highways projects for identifying and promoting good practices. The concept of social auditing that has been successfully used in India and lessons learned from it could be adapted and applied in the environmental audit context.

3.18 In many instances multiple agencies are involved in related aspects of the projects, such as the regional office of MoEF for tree felling and compensatory afforestation, SPCBs for regulatory monitoring of Air and Water Act and conducting public hearings, and the State DOEs for monitoring MoEF and/or State imposed environment clearance conditions. This creates confusion regarding overall responsibility of project supervision. To improve enforcement of environmental requirements, the roles and responsibilities of each agency at the central and State levels with respect to the impacts that are to be monitored should be better defined and/or communicated to the developers.

3.19 Transmission lines do not require an EIA unless significant forest area lands are to be acquired. However, massive construction of transmission lines is expected in very sensitive areas to connect to major hydro power sources in the North-East and Himalayas, including sensitive and urban areas in the country that has the potential to affect the livelihood of people living in the right of way or affect biodiversity, forests corridors for wildlife, and other sensitive habitats. There are some examples that have involved habitat fragmentation and electrocution of elephants due to low voltage transmission lines and impacts on local village roads during transmission line stringing. It is therefore important to develop clear procedures and guidelines for dealing with environmental issues in the transmission sector.

Better Reflecting Source Diversity in Standard Setting

3.20 The regulatory framework in India does not permit any State government or SPCB to lower either ambient environmental quality or discharge standards fixed by the central government in any region. Some argue that these requirements should be rewritten to reflect the regional and local carrying capacities rather than a nation-wide concentration based standard. However, carrying capacity studies undertaken in India (Table 3.1) have concluded that setting area-differentiated ambient standards, based on local carrying capacities, would be too difficult to implement. In almost all countries, the national environmental standards represent the minimal baseline or floor in which to protect public health and the environment. States are allowed to adopt more stringent, not less, standards if greater protection of a regional or local natural resource is warranted. A way to reconcile these different perspectives and needs is to strengthen/expand the application of the land use or zoning concept in setting national standards.

3.21 Another concern expressed by many industry stakeholders is that national emission standards and discharge requirements for several industries are higher than what is possible to achieve considering the type of production process and technology, as well as the economies of scale. Addressing this concern is fundamental to improving compliance performance.

3.22 The current national environmental discharge standards in India are determined mainly on the basis of industry studies undertaken by technical institutions at the initiative of the CPCB. These studies assess available abatement technologies and provide tentative estimates of costs for different levels of abatement. However, while the CPCB studies look at the availability and costs of abatement technologies, they do not generally consider the impacts of these costs on a variety of sources, including smaller and/or older units, and the implications for the economy as a whole. One particular example from the power sector review is that concerning old, mostly publicly-owned coal power plants, some of which have been in gross non-compliance for years (Box 3.2).

Box 3.2: Setting Feasible Emissions Standards in the Country-specific Context — Lessons from India's Coal Power Plants Story

Source emission standards for Suspended Particulate Matter (SPM) from coal power plants in India — 150 $\mu g/Nm^3$ for generation capacity over 210 MW and 300 $\mu g/Nm^3$ for generation capacity under 210 MW — are consistent with international benchmarks. However, seven years after the notification introducing these standards (1998), over one-third of coal power plants are yet to comply with the national emissions standards (and 27 are yet to comply with the effluent standards). These plants are old, in poor shape and typically owned by cash-strapped state government utilities. Meeting the standards is not possible without a major and expensive Renovation and Modernization (R&M). Government of India has been implementing the R&M program for about 20 years; however, progress has slowed down in the past years, due to severe power shortages making it impossible to shutdown a plant generating cheap power for renovation.

A review of best international practice suggests that in this situation the environmental authority may wish to explicitly modify the requirements for certain sources, such as these old plants, based on transparent criteria, and/or extend the timeframe for meeting the standards, rather than allow a prolonged situation of non-compliance that erodes the credibility of a regulatory program and creates a "moral hazard" issue.

For example, the European Union Integrated Pollution Prevention and Control (IPPC) Directive for power plants requires that the permit conditions including emission limit values be determined on the basis of Best Available Techniques (BAT), which account for economic and technical viability of the plants. The Directive also provides flexibility by allowing licensing authorities, in determining permit conditions, to take into account: the technical characteristics of the plants, its geographical location, and the local environmental conditions. (Source: http://ec.europa.eu/comm/environment/ippc/)

3.23 It is thus reasonable and practical to build greater *flexibility in the procedure for setting and applying source standards* that would account for a diversity of pollution sources which all have different abilities to respond to the regulatory regime. International experience further shows that those countries where regulatory programs have worked well and compliance is good adopt new regulations after an economic impact assessment and/or substantive consultations with the affected industries.

3.24 There is an obvious value in strengthening the methodology for *an economic impact assessment of the proposed environmental standards/regulations* in India, including the impact on different segments of industries and the labor market. This should draw on best

practice international experience adjusted to the structure of the India's economy. Assessment of available technologies enhanced by sector-wide economic analysis would be a useful instrument for establishing the techno-economic viability of the prescribed standards. Updated standard setting procedures should also consider *differentiating between new and old sources, between larger and smaller units, and allowing a phased implementation schedule* that is sufficient to meet the requirements (which could be adjusted to different sources and locations). At the same time, regulations should be backed by *credible enforcement* sanctions for failure to meet new standards by the deadline, as well as provide *practical incentives* to facilitate compliance with new standards ahead of schedule (an approach often used by the European Union countries), or when local conditions dictate the need for an accelerated compliance schedule in an area.

3.25 These considerations are particularly important as India moves towards expanding the set of standards and regulations for industrial sources; for example, developing standards for hazardous pollutants emitted by a chemical industry. The diversity of India's industry needs to be recognized by the standard setting process, to avoid a continuous "moral hazard" from inability to enforce and comply.

Strengthening Toolkit to Promote Compliance

3.26 To meet the environmental standards/regulations the regulated community must have the *motivation* and *ability* to comply. In environmental management, motivation largely rests on effective enforcement (credible threat of a proportionate punishment); however, it can and should be also reinforced by incentives and rewards for "good behavior". The latter reduces the enforcement burden of the regulator and helps achieve the desired outcome (e.g. improved environmental compliance) at a lower cost to society. However, motivation will fall short of the target if the polluter has no knowledge, technology, or financial resources to take the action needed. Thus, an environmental regulator must develop a diverse toolkit, particularly for India's diverse economy, to address the needs and circumstances of the different players. This section highlights some (not all) possible areas of expanding the current toolkit that were identified as priorities in the analysis and consultations with stakeholders.

Packaging Compliance Assistance to SMEs

3.27 Shifting the focus on reducing pollution from SMEs emerged as a top priority. Lack of knowledge, access to technology and financial resources are all significant barriers to compliance by SMEs, especially among small-scale industries (SSI). Given these barriers and constraints, compliance assistance schemes are widely used for SMEs. For example, in Japan, the government owned Japan Environment Corporation provides financial support for the relocation of SMEs as well as low interest loans for purchasing pollution prevention equipment. In Taiwan, under the sponsorship of the Taiwan Industrial Development Bureau, low interest loans are offered to SMEs to implement waste minimization practices.

3.28 The MoEF, CPCB and SPCBs, in collaboration with industrial associations (such as CII) have programs to provide technical information to SMEs on different environmental technologies and alternative approaches to pollution prevention. The MoEF has also launched a centrally sponsored scheme for enabling the SSIs to set up pollution control equipment for treatment of effluents. The financial incentives included a central grant up to 25 percent of the total cost of the CETP on the condition that a matching grant is sanctioned and released

by the State government. The CETP companies are expected to meet the remaining cost by equity contribution by the industries and loans from financial institutions. This initiative has helped set up more than 90 CETPs, currently operating with varying degree of performance, for the management of effluents from clusters of SSIs. Similarly, under the Credit Linked Capital Subsidy Scheme, the Ministry of Small Scale Industry is providing assistance to small scale units for adopting cleaner production technologies and installing pollution control measures with financial support up to Rs. 10 million (US$ 225,000) with 15 percent subsidy through the Small Industry Development Bank of India (SIDBI) and National Bank for Rural Development (NABARD). CPCB has also made an effort to develop pollution prevention guidelines and pilot demonstration projects, focused on SME clusters, with a view to providing lessons and the basis for wider replication.

3.29 The most successful programs for SSIs have involved a multi-pronged approach to compliance which incorporates a *complete package* of targeted regulation, a credible threat of enforcement, information dissemination, and technical and financial assistance to comply.

3.30 The West Bengal PCB has adopted such a program for a cluster of industries in Kolkata, which integrates tightening emission standards and focusing enforcement efforts with technical assistance and financial help (Box 3.3). Similarly, a "packaged" approach of combining regulation, enforcement, technical and financial assistance, including support with providing the gas infrastructure, has been applied in Agra, reportedly also with success.

Box 3.3: Cooperative Approach for SMEs — A Good Practice Example from Kolkata

Small scale industries were found to contribute 44 percent of the overall particulate emissions in a central area of Kolkata. The emissions largely came from the use of older, energy inefficient coal fired units for the manufacturing processes, such as small boilers, ceramic kilns, and cast iron foundries. The West Bengal PCB adopted a stricter particulate emission standard and intensified enforcement efforts targeting units located in that area. Most of the units using small coal fired boilers needed to change to an oil fired boiler (typically using a light oil) to meet the standard. To facilitate compliance, a fund was created at the WBPCB with the support of the India-Canada Environment Facility, to assist small scale industries in financing the cost of measures that would result in meeting the standard. Since a natural gas network is not available in Kolkata, a typical measure was to replace a coal boiler with a more energy efficient and cleaner oil fired boiler. The fund provided a matching grant (50 precent of capital cost) paid *after* the conversion was implemented. The WBPCB also involved industrial associations that helped to reach out to the units and provide technical advice. A recent assessment of pollutant emission reduction after the adoption of new standards and establishment of the fund showed a reduction of about 98 percent of the total particulate matter from the units who had completed the conversion from coal to oil fired units. The WBPCB program has many elements of best practice, such as using scientific information to set a regulatory priority and creating a targeted regulatory program, complemented by outreach, and technical and financial assistance, and building partnership with the regulated industry. (Source: http://www.wbpcb.gov.in/)

3.31 The success of well-packaged programs targeting SMEs and SSIs clusters lends itself for wider replication across India. It is important to systematically collect, review and disseminate information about such programs, as well as use this information and emerging lessons for initiating a *national program* for SMEs what would guide the design of suitable packages where there is a need, as well as provide matching grants for compliance assistance, building on the CETP initiative by the MoEF. For example, when air pollution is a key concern for a particular SME cluster that needs to be addressed by energy efficiency and/or

fuel switching measures, simultaneously resulting in reduced carbon dioxide emissions, it would be also useful to facilitate, as part of this program, access to carbon finance or other concessional global climate change financing instruments.

Strengthening Enforcement Deterrents

3.32 **Need for Credible Enforcement Deterrents.** In any regulatory situation, there will be some facilities that will voluntarily comply, some that will never comply, and a significant number of others who will only comply if they believe there is a sanction for noncompliance. Without a credible deterrent of enforcement, violators will not change their behavior and polluting conditions will continue. However, to be a credible deterrent, there must be a good chance that (i) violations will be detected, (ii) that the response to the violations will be swift, and (iii) the response will involve an appropriate sanction. Unfortunately, in India each of these conditions for a credible deterrent is lacking. Although the environmental laws and regulations are comprehensive and protective, there are some inherent procedural deficiencies related to the enforcement and prosecution of environmental violations. Technically, a SPCB has the legal authority to direct a polluting industry to shut down an offending factory, but this sanction is rarely used. Closure of a facility is associated with the loss of jobs and economic livelihood for the community, and therefore is viewed as a last step enforcement measure.

3.33 The SPCB also has the legal authority to file a criminal case against a violating company. While some SPCBs have filed criminal cases, the courts are frequently too busy with other criminal and civil cases that environmental cases get delayed for a long time before any action is taken. For example, in accordance with the Water Act, the SPCBs must file a case before the lower court for an action against a polluting unit and the "onus of proof" is vested with the Board. Unlike the Public Interest Litigations (PILs) which are filed in the Supreme Courts or High Courts, the lower courts do not seem to have enough time and interest in hearing environment related cases. Thousands of cases filed by the SPCBs have been pending in State courts for many years. In some cases where decisions have been taken, the polluting industries have been given the benefit of doubt because the Boards could not adequately meet the "onus of proof" test.

3.34 There are also cases where the polluters, even after conviction, have escaped penalties through legal maneuvers by highly paid advocates who plead their cases or because of corruption. Unlike some other countries where the pollution control authorities are empowered to impose fines depending on the nature and extent of pollution caused, the SPCBs have to approach the judiciary for this purpose. A recent United States Environment Protection Agency (USEPA) Report on Environmental Compliance and Enforcement in India found that "Seeking redress in the courts is time-consuming and resource-intensive, and further strains scarce government resources. In addition, the (criminal) cases are often unsuccessful, with 977 of the 7357 cases being dismissed by the courts or ultimately withdrawn by the Government." (Miller, 2005).

3.35 As a result, regulatory agencies often choose not to pursue sanctions, because the available sanctions are either disproportionate to the environmental infraction or too time-consuming to pursue. Hence, in the absence of credible deterrence, many polluters continue to discharge illegally knowing that there will be no legal consequences. It has been reported that some industries have not installed effluent treatment plants or air pollution control,

because they do not believe there is sufficient reason (e.g., deterrent) to comply with environmental standards.

3.36 In some countries, environmental authorities, such as CPCB and SPCBs, have the authority to apply administrative penalty to ensure swifter enforcement actions and reduce the backlog of court cases. The authorities could also use administrative penalties collected as an additional source of revenue to support implementation and enforcement of environmental programs (see Box 3.4 for an example from US). However, using this relatively common instrument has been difficult for India's legal enforcement framework. In this context, a provision in the NEP (2006) that "a judicious mix of civil and criminal processes and sanctions will be employed in the legal regime of enforcement, through a review of the existing legislation" (MoEF, 2006, page 17) is a very encouraging and much needed development, which could greatly improve the credibility of the enforcement regime in the medium to long-term.

Box 3.4: Use of Administrative Enforcement Authorities as a Credible Deterrent

In the United States, the federal and state EPAs can issue an administrative order to resolve a violation without going to the courts for relief. Administrative orders are legally enforceable, provide evidence of the violation, and afford the violator due process and the opportunity to be heard. Under an administrative order, the violator will be required to take corrective actions with a prescribed time period, penalties may be assessed, and supplementary enforcement projects may be established. Where appropriate, the USEPA and state EPAs use administrative enforcement as their preferred first response for routine enforcement cases because it is viewed as more expedient than the judicial system. (Source: Miller, 2005)

3.37 **Exploring the Use of Alternative Enforcement Deterrents.** An alternative approach that can approximate the impact of an administrative sanction for certain polluters is the use of *environmental performance bonds*. A performance bond is a legal guarantee evidenced in a written document against any loss caused by the issuer's inability or refusal to perform previously agreed commitments and which result in significant impacts to the environment. It is a (contingent) payment which is triggered once an agreement is violated. The firm can either deposit the stated sum in an escrow account with the regulator, or more typically obtain a financial guarantee from a bank or financial institution, which is paid once the contract conditions are breached.

3.38 Environmental bonds are most useful in two circumstances: (i) where regulators lack the judicial authority or administrative capacity to impose proportionate and effective sanctions once an infringement has occurred; and (ii) for highly polluting and hazardous industries where firms can evade their environmental responsibilities by liquidating the enterprise. By imposing joint liability between the polluter and the guarantor, the bond lowers incentives to elude regulators through liquidation.

3.39 A common example is from the mining sector (in various countries, including Australia, Papua New Guinea, and United States) where a mine operator agrees to post a performance bond to cover the costs of re-vegetating and reclaiming the land, which has been the site of the mining operation. The bond is not released until the property is returned to its pre-mined state and if the site is not re-vegetated as required, the bond is forfeited to the regulatory agency. The legal and administrative precedent for the use of environmental bonds was first established in India when the Indian Bureau of Mines introduced a liability bond

where the mine proponent looses money or the bond for violating the approved mining closure plans (Rs 15,000/ha for small mines and Rs 20,000/ha for a major mineral mine).

3.40 **Expanding the Bank Guarantee Program Based on Lessons of an Initial Phase.** A very encouraging example of this is the use of a bank guarantee program, being piloted in some States of India. Under this program, when a SPCB discovers a violation, it will require the violating company to post a bank guarantee to ensure that the company installs pollution controls according to the agreed upon compliance plan and schedule. Renewal of CTO is conditional on such a guarantee. If the violating company fails to meet the compliance agreement and schedule, a portion of the bank guarantee is forfeited and given to the SPCB for its discretionary use. The amount of the forfeiture is usually decided by the Chairman and Member Secretary of the SPCB. The West Bengal PCB has two examples of forfeiture for failure to meet the compliance schedule — a refinery forfeited Rs 500,000) of a Rs 1 million bank guarantee and a steel mill forfeited Rs 500,000 lakh of its Rs 2 million bank guarantee (Miller, 2005).

3.41 This initiative would be very useful to promptly conduct a careful evaluation to draw lessons for further replication. While expanding the use of the bank guarantee a number of additional advantages should be considered to strengthen the impact. First, an environmental performance bond gives the regulator flexibility in setting the sanction (payment) for violations. Thus, the "penalty" can be set at a level that is proportionate to the expected damage from violation. Second, it provides a financial incentive for firms to establish sound environmental credentials. This can be achieved when the price paid for the guarantee increases with the history of non-compliance. Third, it exposes polluters to further compliance pressures from a new actor, the guarantor, and so lowers the ability to circumvent regulations by colluding with environmental authorities. Fourth, it can be used proactively, rather than retrospectively, by being required for the issue for CTE and not only for renewing CTO. This approach would be particularly appropriate for high risk, hazardous processes.

3.42 As with any other regulatory instrument, environmental bonds are not appropriate in all circumstances. These are unsuitable for small enterprises, particularly in the informal sector that operate on small profit margins and lack access to credit. Conversely, large polluting industries as well as municipal facilities (e.g. hospitals and sewerage treatment plants) are well suited for the use of environmental bonds. This again reinforces the critical need for a judicious mix of instruments to effectively enforce compliance in the diverse Indian economy, highlighted by the NEP.

Augmenting the Use of Innovative Approaches and Incentives for Good Performance

3.43 India's situation of legal difficulties with applying effective administrative sanctions lends itself to a greater use of innovative incentives. These instruments have been carefully reviewed by the CPCB and MoEF, with a sound conclusion to move ahead in a phased manner, starting with simple tools (Box 3.5). Once the bank guarantee system has been fully established, further expanding the toolkit by adding suitable economic instruments would be useful to consider. The opportunities provided by economic programs and instruments, such as Special Economic Zones or tariffs in external trade, should also be systematically assessed and used to encourage environmental improvements and investments.

3.44 Incentives need not be merely financial. Applying *regulatory flexibility* to companies using pollution prevention, waste minimization, and toxic substance use reduction strategies can also foster greater compliance.

3.45 One approach is to *link consent management to performance.* For example, in Andhra Pradesh and Gujarat many industries in the bulk drug and pharmaceutical sectors frequently change their formulations to stay competitive. They also have good compliance records. However, they do not report this change to the SPCBs as it would require seeking a new CTO. Companies who consistently meet or exceed the standards for compliance should be given the regulatory flexibility to modify their existing CTO if they agreed to certain parameters for improved environmental performance. In addition, the period of permit renewal for CTOs could be linked to compliance performance, extending the length of permits for stronger performing companies. This would reduce the burden of understaffed SPCBs and allow them to focus scarce resources on violators.

Box 3.5: Economic Instruments for Pollution Control: Potential for India

An international workshop on economic instruments for industrial pollution prevention and control was held in Delhi in June 2001. It brought together Indian and international experience with the application of economic instruments. The three-day workshop put forward a variety of tools used around the world, including pollution charges, tradable permits, performance bonds, and taxes on output and inputs, as well as the instruments of persuasion, such as public disclosures. The stories from countries as different as China, Columbia, Indonesia, Philippines, Thailand, United States and Vietnam were bridged with the current experience in India to generate the way forward to expanding the appropriate mix of instruments for India.

Several important messages emerged from the workshop. First, there was a consensus that the existing regulatory system in India needed to be strengthened by a greater use of incentives. Second, it was noted that for these instruments to work well in practice, sufficient attention should be given to the details of implementation, including the capacity of regulatory institutions, during the design stage. Third, the workshop concluded that a greater reliance on economic incentives should start with testing a simple instrument, consistent with India's legal and institutional framework for pollution management. Finally, the workshop recommended initiating the use of such an instrument on a pilot basis.

A recent introduction of the pilot bank guarantee program, a kind of performance bond instrument, for non-compliant industries is consistent with these recommendations.

(Source: Shrivastava, 2001)

3.46 There are a growing number of *voluntary incentives* by the industry to demonstrate environmental stewardship to company shareholders, consumers, communities, consumers, and other key stakeholders. Many companies in India and internationally have implemented the *Environmental Management Systems (EMS),* such as *ISO 14001*, resulting in both economic and environmental benefits from improved performance and production efficiency. This is compelling many export-oriented firms, such as chemical manufacturing facilities in Gujarat or pharmaceuticals firms in Andhra Pradesh, to adopt voluntary initiatives to demonstrate corporate responsibility as well as sustained environmental performance beyond strict regulatory compliance. For example, the numerous export-oriented industries in Naroda are reportedly taking steps to improve their environmental compliance primarily driven by the export demand from their clients abroad.

3.47 In many countries, environmental regulators tend to support voluntary incentives by industry, so as to not create conditions that would discourage innovation as it seems to

sometimes happen in India. There are instances where successful voluntary agreements made between the industry and government to gradually improve environmental performance beyond compliance requirements have later been made mandatory and incorporated into law. One example is the agreement with the cement industries to improve their emission levels to 50 $\mu g/Nm^3$ from 100 $\mu g/Nm^3$ which is set to become a legal requirement in 2006. Some SPCBs have started requesting an ISO 14001 certificate from the 17 most polluting categories of industries before the renewal of their consents/authorizations. While this has reportedly led to better compliance, industry stakeholders consulted during the study mentioned that turning a voluntary agreement with individual companies into a mandatory requirement for the entire sector can be a disincentive for companies to explore voluntary initiatives in the future. In this respect, an approach adopted by the Gujarat PCB to provide incentives to industries implementing EMS, might be a good practice example to follow (Box 3.6).

Box 3.6: Promoting Environmental Management Systems

The Gujarat PCB has adopted a series of incentives to promote industries choosing to design and implement environmental management systems such as ISO 14001. These incentives include giving priority environmental approvals within a period of 45 days; extending the water consents from 5 years to 6 years; allowing units with ETP to be eligible for 25 percent fee rebated provided they do not exceed the water limits under their consent and meet the standards under the Water Act. In addition, the Gujarat PCB has promoted a series of industry specific guidelines for certain sectors such as aluminum, cement, chlor-alkali, pulp and paper under the Charter of Corporate Responsibility (Source: GPCB website, http://gpcb.gov.in)

3.48 The Naroda industrial estate in Gujarat also used an *environmental auditing* approach to improve their knowledge of resource utilization and generation of wastes. Under this approach, a facility would conduct a periodic and comprehensive evaluation of different management measures to achieve compliance including the development of a formal environmental compliance plan, environmental training programs for all employees; assessment of risks and costs posed by facility emissions and wastes; and, establishment of monitoring, recordkeeping, and reporting systems for internal and external audiences. In the United States, some State environmental agencies have sought to encourage environmental auditing by relaxing certain enforcement requirements for companies with proven and effective auditing programs. A similar approach could be adopted by SPCBs for companies with successful environmental auditing programs. Consent periods could be extended or inspection requirements could be lessened to promote environmental auditing.

3.49 Regulatory incentives can be also linked to the quality of *self monitoring and self reporting data*. According to the USEPA Report on Environmental Compliance and Enforcement in India, there is significant scope for improving the use of such data. Industries whose data are consistently validated by SPCB monitoring, for example, could be inspected with a lesser frequency than those whose data are not consistent with the inspection results.

Extending the Knowledge Base to the Regulated Community

3.50 A lack of knowledge was cited in the analytical review and case studies as an important reason for continued environmental degradation. There is a general consensus on the need to strengthen the quality and extent of environmental information that is made

available to all the sectors. Knowledge management involves information on the available technology to prevent, monitor, control, or clean up pollution, and on operation and correct maintenance.

3.51 There is also a need for a wider dissemination of basic information on environmental regulations, which provide clear answers to the following questions: What are the environmental requirements? Why are the environmental measures necessary? Who is subject to the requirements? When do they apply? How can they get into compliance? and, What are the consequences of non-compliance?

3.52 A substantial amount of information is already publicly available, and efforts are being made to facilitate and promote knowledge of modern technologies and practices. The Government of India has adopted a Policy Statement for Abatement of Pollution which provides several instruments to prevent pollution, including the adoption of a Life Cycle Assessment (LCA) for specific sectors to optimize the utilization and conservation of resources. A National Action Plan for Cleaner Production has also been drawn up to assist in developing and adopting cleaner production technologies[17]. However, it appears that the information does not reach out evenly across India, putting the less industrialized but rapidly industrializing areas at a disadvantage. There is a need, strongly endorsed by all stakeholders, to create and strengthen the network of regional environmental management centers, housed with the appropriate *existing* research and training institutions that would provide knowledge and training of the highest quality *comparable across States*.

Using the Power of Public Information and Pressure to Motivate Compliance

3.53 It is more likely that industry and project proponents will take corrective action when incidents of non-compliance are brought to the attention of the caring public. Public disclosure programs, pioneered by the Indonesia's PROPER program (Box 3.7), have proven to be a useful complementary tool in motivating industries to improve their environmental management and performance. In India, several green rating programs that rate the performance of various sectors or area clusters have been undertaken by the Confederation of Indian Industries (CII), Center for Science and Environment (CSE), and other organizations in India. With the adoption of India's Right to Information Act, the power of public disclosure is likely to be exercised more often and impose greater accountability on the industry and government for improved environmental performance.

Box 3.7: Expanding the Toolkit — the Power of Public Disclosure

The Indonesia Environmental Impact Management Agency established a highly successful public disclosure program known as PROPER (Program for Pollution Control, Evaluation, and Rating). The underlying premise of this program and the key to its success was the concept of creating incentives for compliance through "honor and shame." PROPER employs a color based rating system to rate the environmental performance of individuals plants based on compliance with water, air, and hazardous waste regulations, EIA requirements, quality of environmental management systems, resource management and use, and community development and relationship. The program has many benefits and many stakeholders: (i) for companies, it is a benchmarking tool to measure performance and a public relations tool to promote itself as an environmentally friendly company; (ii) for investors and financial institutions, it is a clearinghouse to evaluate company risks and performance; (iii) for the public, it is a tool to measure the company's compliance and government's enforcement record; and (iv) for the government, it is a tool to encourage companies beyond compliance and to identify performance weaknesses in key sectors and provinces. Public disclosure programs have recently been introduced in the Philippines, China, and Vietnam.

(Source. Afsah and others 1997; 2000)

3.54 A computerized State and national level information management system would also improve access to relevant compliance information. Ideally, the information management system should include specific information on compliance, such as required permits, compliance status, current and outstanding violations, corrective action plans, compliance schedules, and status of enforcement actions. The CPCB/SPCBs could use the information in the report to evaluate the performance of key sectors, analyze areas of compliance weaknesses, and target priority measures for improved enforcement.

3.55 As discussed in Chapter 2, the public can serve as an effective regulator in alerting government officials to violations and polluting conditions. It is important to continue supporting citizen monitoring efforts that CPCB/SPCBs have initiated by promoting public–private partnerships for compliance monitoring and establishing public notification procedures for sharing relevant data and analyses of environmental conditions, including the release of information concerning toxic and hazardous pollutant discharges.

3.56 Ultimately, it must be recognized that voluntary incentives, information disclosure and public participation alone cannot reverse the situation of widespread non-compliance. Effective regulatory programs and enforcement deterrents remain the foundation on which the culture of environmental compliance is built. However, these complementary tools can strengthen this foundation and facilitate compliance at lower enforcement cost so that a more robust and enduring structure can emerge.

Matching Regulatory Capacity with Regulatory Mandates in a Growing Economy

3.57 Even if all the recommendations listed above, such as creating additional compliance incentives and strengthening enforcement deterrents, were adopted, a major barrier to successful implementation would be the capacity of an environmental regulator to deliver on these initiatives. The regulatory agencies are already under-staffed and under-funded in meeting its existing obligations to implement regulatory mandates of various national and State laws and directives from the courts. A recent report by the Planning Commission concluded that the SPCBs are currently characterized by a dominant presence of non-technical staff, differential availability of staff for monitoring polluting industrial units, large staff vacancy positions, vast variations in financial positions, and prohibitive spending restrictions imposed by State governments (Planning Commission, 2005b). Not surprisingly, the report found that compliance of industrial units with the stipulated pollutant standards is poor. Overall nationwide compliance level is about 50 percent, while the situation is better — close on average to 80 percent — for highly polluting units, which have been the key focus of SPCBs.

3.58 The poor current capacity assessment by the Planning Commission and the adoption of more aggressive industrial promotion policies in many States has placed increased pressure on the SPCBs for a quicker turnaround of CTE and CTO and environmental clearances, notwithstanding that the volume and complexity of these requests are increasing while SPCBs resources remain unchanged. There is also a need for expanding the scope of regulation and introducing new regulatory programs and tools, as described above, to arrest continued environmental degradation.

3.59 Unless an increasing public demand for better performance by the environmental regulatory agencies is matched by adequate support to these agencies, conditioned on

institutional reforms to increase efficiency, transparency and accountability, it would be naive to expect substantial progress and unfair to solely blame the regulator for the lack of it. This section proposes a number of key actions which emerged as priority.

Making the Processes More Efficient

3.60 Given the staffing constraints that many SPCBs face and the growing demand for services, it is critical to maximize opportunities for rationalizing processes and upgrading technologies they rely on in their daily routine. The following areas have been highlighted by this country environmental analysis.

3.61 **Balancing Consent Management with Compliance and Enforcement Responsibilities.** SPCBs are the primary designated agencies to implement and enforce most of the environmental laws and regulations at the State level. Their responsibilities are vast — establishing pollution control programs for the State; issuing State-specific regulations for air, water, waste, and other environmental media; implementing the consent management system for CTE and CTO; managing the EIA system; addressing citizen complaints and educating the public on environmental issues; monitoring and ensuring facility compliance; and implementing court directives and developing State action plans. Of these responsibilities, a disproportionate amount of time is spent on the consent management system, because rapid industrial growth has led to increased demands for CTEs and CTOs and new infrastructure construction in the highways and power sectors. These increased demands have in turn mounted pressure on the SPCBs to process consents within prescribed deadlines. As a result, less time and emphasis is spent on monitoring and tracking compliance of existing facilities and pursuing enforcement actions against polluting facilities.

3.62 This trend in allocating time and effort needs to be reversed and better balanced. As the number of industrial units and infrastructure investments increase, so do the requirements for monitoring and actual enforcement of the provisions agreed in CTE/CTO. A way of rationalizing consent management, already adopted by several SPCBs, is to link the frequency of renewing CTO to environmental risk and past compliance/performance record of the facility. For example, consent periods could be extended (and inspection requirements could be lessened as well) for companies with successful environmental auditing and/or self-monitoring programs.

3.63 **Outsourcing of Non-core Technical Functions**. Not all regulatory functions need to be retained in-house and some may be performed more efficiently through contractual arrangements with private firms or NGOs. This would serve the dual purpose of providing needed support to SPCBs in fulfilling its mandate and using India's strong technological advances and technical expertise. For example, some monitoring and laboratory analysis functions could be outsourced to trained technical staff in research institutes or universities. Likewise, certain information management or data collection functions could be outsourced to information technology firms or linked to industrial association networks. In outsourcing regulatory functions, it will be important to establish guidelines that would ensure that the organization has no conflict of interest with a regulated entity and that quality assurance mechanisms are in place.

3.64 **Capitalizing on Advances in Monitoring Technology**. Many SPCBs currently rely on stack testing to monitor the compliance of the majority of industrial units. Continuous Emissions Monitoring (CEM) is an instrument that allows the accumulation of data at a pre-

determined time and over a longer period than the stack tests. The CEM can reduce the inspection burden on the regulatory agency by requiring the data to be self reported, or even by directly transmitting the reading results on a stack to a computer at the regulatory agency. Currently, online stack monitoring instruments are being provided to a very limited number of new large sources, such as new NTPC generation plants. Given the difficulties with CPCB/SPCBs staff positions, as well as public concern over possible corruption during on-site inspection, "leap-frogging" to a greater use of the CEM technology seems a particularly attractive option in India, and is currently being promoted by the CPCB. However, switching to CEM on a large scale would be expensive and needs to be phased-in. In addition, a strong quality assurance plan, along with the capacity to implement it well, is needed, which would include calibration checks and adjustments, record-keeping and reporting, and procedures for conducting periodic performance tests.

Strengthening Staff Resources and Skills

3.65 **Ensure Adequate Staffing to Meet an Increasing Workload due to Rapid Growth.** One of the main institutional challenges for regulatory agencies is about recruiting and maintaining qualified technical staff to perform mandated duties. Of the approximately 500 CPCB employees, only 120 technical staff are associated with environmental pollution control. In comparison, the China EPA has 1,647 employees of which 215 are assigned to environmental protection and 97 to monitoring centers[18]. The USEPA has 18,000 employees throughout the country. At the State level in India, which has the primary responsibility for most environmental responsibilities, many SPCBs are chronically under-staffed as indicated by vacancy ratios in Table 3.2.

Table 3.2: Comparison of SPCBs or Every 100 Polluting Units in the States, India, 2003

State	Sanctioned Staff	Staff in position	No. of technical staff	No. of technical staff /Total number of staff) x 100	(Vacant posts/ sanctioned posts) x 100
Andhra Pradesh	4.72	3.11	1.17	37.61	34.08
Assam	-	-	-	47.21	3.43
Bihar	16.66	15.69	10.28	65.52	5.48
Goa	9.68	5.24	1.61	30.77	45.83
Gujarat	7.80	6.69	3.50	52.34	14.16
Haryana	12.37	8.59	2.16	25.14	30.62
Himachal Pradesh	52.65	44.25	11.50	26.00	15.97
Karnataka	22.19	7.77	4.47	57.48	64.97
Kerala	29.83	28.77	14.27	49.59	3.56
Madhya Pradesh	20.13	21.92	9.49	43.29	-8.87
Maharashtra	8.47	7.00	3.23	46.20	17.39
Orissa	21.05	15.31	5.84	38.13	27.27
Punjab	6.26	2.86	2.32	81.13	54.31
Rajasthan	9.93	9.09	3.89	42.72	8.44
Tamil Nadu	11.42	8.54	3.62	42.39	25.24
Uttar Pradesh	11.68	8.52	3.09	36.25	29.99
West Bengal	5.30	4.19	2.49	59.44	20.99
All Boards	10.73	8.10	3.70	45.69	24.46

Source: Planning Commission (2005b)

[18] Source: China's State Environmental Protection Administration website, http://www.zhb.gov.cn/english/

3.66 Many State governments, as part of the much needed reforms to promote fiscal discipline, have imposed indiscriminate hiring freezes on all government agencies, affecting the ability of SPCBs to fill vacancies and hire additional staff for the clearance and inspection process. This approach does not take into account that the workload involved in providing environmental clearances and performing compliance inspections is rapidly increasing due to the booming economy and unprecedented industrial growth in many places. As Table 3.2 shows, the number of SPCB staff in position per 100 polluting units greatly varies across States, with many SPCBs, particularly in more industrialized States, having alarmingly low ratios for total and technical staff.

3.67 As more States are set to experience rapid industrial growth, especially in pollution-intensive sectors (such as in Orissa), it is important for central and State environmental agencies to take up the issue with State governments, and agree on the need for *justified staffing plans for SPCBs* that would allow for some additional hiring, subject to making a strong case. The case should be made on the basis of *verifiable evidence* of increased workload (using past trends and near-term projections) and taking into account possible efficiency gains through improvements in processes and technology, discussed above. Ideally, a staffing plan should be an integral part of a broader capacity and efficiency enhancing plan (described below).

3.68 **Upgrading Skills.** The willingness to enforce compliance by regulators versus the willingness to ensure compliance by industries is subject to a well-known information asymmetry, resulting in a possibility for some polluters to misguide regulators based on their greater access and knowledge about the sources, magnitudes, and concentrations of pollutants. In this context, it is difficult to overemphasize the importance of constantly feeding SPCBs with state-of-the-art technical knowledge and equipping with resources for monitoring the polluting units, assessing the environmental data, and proper collection of evidence to prosecution of cases.

3.69 Inspectors at CPCB/SPCBs are generally well educated and technically proficient, but their educational background and current training does not necessarily prepare them for the technical and procedural issues regarding compliance and enforcement. Some SPCBs have a basic one week training program for inspectors on general compliance and enforcement, but the number of training programs designed for specific compliance and enforcement issues is extremely limited. Even if training is provided, many inspectors do not receive the training because of travel or time constraints and training resource materials are scarce. There is also no national guidance on the minimum training and field requirements for an inspector or a centralized repository for training programs and materials (Miller, 2005).

3.70 To address this, the MoEF/CPCB would need to develop national guidance on minimum inspector training requirements and develop industry specific inspection manuals to be used by all SPCBs. The CPCB/SPCB should also consider collaborating with local universities to develop regular environmental curriculum and training for SPCBs and local governments. As more functions are delegated to the regional and local offices within the State, providing training at the local level becomes increasingly important.

3.71 **Building Legal Capacity of SPCB.** The CPCB/SPCBs are the prosecuting authorities in pollution control violations, as well as the target of an increasing number of law suites for failure to enforce compliance. This necessitates substantial legal expertise in

developing sound environmental cases for prosecution in the courts and in addressing PILs and the resulting judicial mandates. While the number of PILs and judicial mandates has grown over the years, little attention has been paid to building legal capacity and training. In addition, it has been increasingly difficult for SPCBs to prosecute cases, in part due to the lack of legal knowledge and enforcement resources to collect the necessary evidence to convict polluters. At the same time, the industry often has the resources — both legal and financial — to defend against protracted litigation or to negotiate a favorable settlement.

3.72 Ironically, the increasing number of PILs and court cases often results in further eroding the very capacity of SPCBs to inspect and enforce, as already limited staff resources are re-allocated to dealing with a high profile law suite. While it is important that general and technical staff at the SPCBs get trained to better understand and deal with the underlying legal concepts for an environmental case, such as the importance of a chain of custody, causation and harm, and procedural due process[19], the number of highly qualified legal staff at the CPCB/SPCBs should also be increased or supplemented with contract attorneys. In addition, collaborative arrangements with local law schools should be explored to establish legal intern and law clinic programs that would help support enforcement efforts by CPCB/SPCBs.

Better Managing Financial Resources

3.73 With regard to financial resources management, SPCBs show varied levels of accomplishment depending on their reliance on government funds or availability of independent revenue sources, such as water cess. Other main sources of SPCB revenues are consent fees and other grants (Planning Commission, 2005b). The introduction of the enhanced water cess rates in 1996 has significantly changed the financial situation for SPCBs giving them additional sources of revenue for operating activities (and is an example of a success story in India's pollution management). However, while some SPCBs appear financially self-reliant, others still depend heavily on the State government for their operating expenditure which can potentially erode their independence in decision-making. Building capacity of SPCBs to raise their own financial resources (e.g. through a timely revision and proper levels of consent fees, or using a bank compliance guarantee program, in addition to water cess) *and* better allocate these resources by focusing on priorities, is an important area for moving forward.

Capacity Strengthening Action Plans for SPCBs

3.74 To coherently address the challenges and needs outlined above, MoEF/CPCB should request and guide SPCBs in developing a capacity upgrading action plan, following the State of the Environment reporting exercise, which establishes environmental priorities and trends in a State. These plans could use a common template (with a flexibility to adjust to particular circumstances) that might include the following areas: (i) developing and implementing a staffing plan, including specific measures to upgrade skills; (ii) developing and adopting tools for better and faster evaluation of environmental assessment of investments; (iii) rationalizing consent management based on environmental risks and re-allocating resources towards a more effective inspection and monitoring; (iv) decentralizing responsibilities to regional offices with the respective capacity upgrade in staff and equipment; (v) undertaking full computerization and Web-based management of application processing and monitoring; and (vi) introducing greater information disclosure and transparency in decision making,

[19] Procedural due process is a legal term meaning that procedures for filing a case are followed fairly and according to the law.

including preparing to meet the requirements of the RTIA. An example of such a plan being developed for the Orissa Pollution Control Board is given in Box 3.8.

Building Capacity of Forest Departments to Perform Regulatory Function

3.75 While this analysis has primarily focused on CPCB/SPCBs, similar issues concerning the need to improve the efficiency of clearance and regulatory functions emerged for the DoF, particularly regarding the granting of forest clearances and conducting compensatory afforestation. Improving the forestry clearance system, as well as the accountability mechanisms in the compensatory afforestation process, was cited as a key issue for all developers, particularly in the hydropower, transmission and highways sectors. Specific recommendations include: (i) clarifying and rationalizing the complex forest clearance process by developing a handbook on classification and definition of forest areas and other land categories; (ii) updating the database of forest lands with forest maps and wildlife data; and (iii) reviewing the responsibilities and processes for compensatory afforestation, including an oversight system. Finally, there is a need for integrating the NPV payment for diverted forest land with compensatory afforestation within a consistent framework that (i) prevents double-counting of the cost inflicted on the developer; (ii) sets a reasonable economic value for the payment (see further discussion on the NPV in Chapter 4); and (iii) provides guidance on how to economically restore lost ecological and livelihood benefits.

Box 3.8: Proposed Capacity Building Action Plan for the Orissa Pollution Control Board

The Institutional Capacity Needs Assessment of Orissa Pollution Control Board has identified the following main capacity needs and action plan:

- Consent management: Redesign the consent management system with implementation at regional offices, expand the length of CTOs and streamline the processing time, prepare an inventory all operating industries and mines.
- Compliance and enforcement: Incorporate self monitoring, self reporting and record keeping requirements in CTO, finalize standardized monitoring and sampling protocols, train staff on legal issues and enforcement procedures.
- Compliance assistance: Insist on bank guarantees, blacklist non-compliant companies with financial institutions, promote self audits for compliant companies, create a compliance assistance hotline.
- Public participation: Train staff in communication and outreach skills, offer technical training to NGOs and civil society, develop public awareness campaigns on emerging growth sectors, establish a publicly accessible electronic database for EIA documents, and project status.
- Staffing: Develop and agree with the Finance Department a staffing plan including in house training programs and additional staffing needs to conduct the core functions in view of the increasing number of applications and inspections.

(Source: World Bank staff)

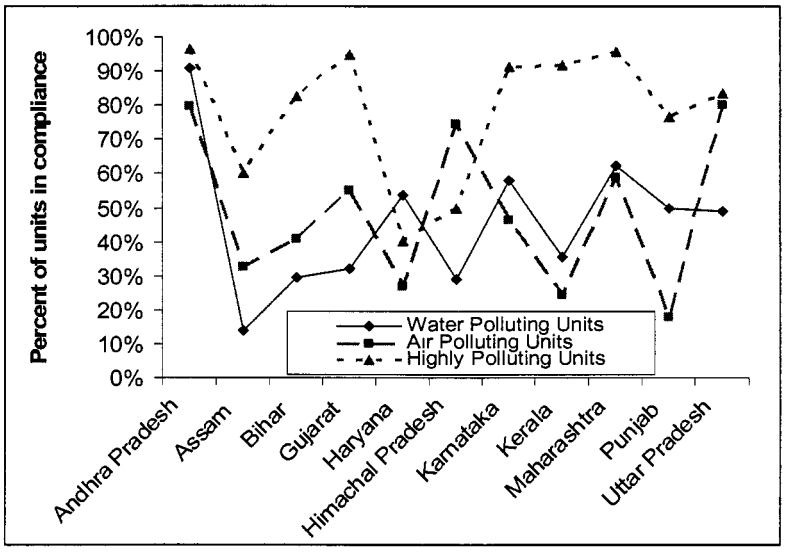
Strengthening Performance Oversight

3.76 While the States have primary responsibilities for implementing and enforcing environmental programs, the national nodal agencies for environmental enforcement — MoEF and CPCB — retain the responsibility to ensure that the national laws and regulations are being enforced by the States. The level of compliance and enforcement among the states is very uneven as shown in Figure 3.2. However, a system of oversight between the central

and State agencies appears weak and lacking *accountability* for the level of performance. Such an oversight function seems to have been assumed by the judiciary.

3.77 To strengthen the existing system of regular information exchange between the State and central level, the CPCB should establish oversight guidelines for the SPCBs which would detail requirements and procedures for reporting, information management, public disclosure, conflict resolution, etc. To ensure the institutional effectiveness and accountability of regulatory agencies, an agreed set of compliance and enforcement indicators and targets should also be included. These indicators would measure both outputs (e.g. the number of facilities inspected and the number of facilities in compliance), as well as outcomes (e.g. improved ambient water quality, reduced forest cover lost). Most of this data is already collected and made publicly available. Importantly, these indicators should be routinely used by CPCB/SPCBs to assess the effectiveness of existing programs and target staff and resources on priority areas; this type of mechanism is yet to be established. Given a large variation in SPCB performance, with some States apparently lacking an incentive and/or ability to improve, MoEF and CPCBs could also consider introducing a *performance-based* program of support to SPCBs, which will reward, for example, for exceeding the agreed targets, in addition to the *needs-based* technical assistance to SPCBs with particularly low capacity.

Figure 3.2: Status of Compliance Across Various States in India, 2003



Source: Planning Commission (2005b)

3.78 In conclusion, the agenda as outlined above for environmental agencies is of immense proportions. It necessities a bold set of actions ranging from updating environmental laws, augmenting regulatory approaches, and refining enforcement strategies, to meet the existing and emerging challenges of rapid growth. As India's economy continues to accelerate and the demand for new development, roads, and energy increases, the performance of the environmental regulator will come under increased scrutiny and pressure. The needed institutional changes, however, cannot be achieved overnight (or even over a year), as many of the measures would involve further examination, design, and consultation with the public, other government agencies, and the regulated community. It is however important to move quickly towards a broad agreement with all major stakeholders on the

priority actions, based on the identified list, and develop a medium-term program of implementing the agreed measures, supported by necessary resources, monitorable targets, and clear accountability mechanisms.

IV. Aligning Sectoral Policies and Incentives

4.1 Discussions, surveys and media coverage in India show that the environmental regulator — represented by the Ministry of Environment and Forests (MoEF), State departments of environment and forests, Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) — is most often to be blamed for various environmental problems by both the public and development authorities. Development authorities feel that their role is to promote projects while that of SPCBs is to enforce compliance, and that while they are doing their job, SPCBs are not doing theirs. This attitude is reinforced by the legal situation where a lawsuit for an environmental violation is filed against the SPCB for failing to enforce and not directly against a polluter for failing to comply.

4.2 Capable and effective enforcement institutions are critical for environmental improvements, as is a vocal civil society. However, there are a number of fundamental ways through which economic development and policies in India (and elsewhere) affect environmental resources, which are beyond the issue of "compliance" with the given set of environmental regulations and standards. This is particularly evident in the power sector. There is also a fundamental need, demonstrated by a history of environmental management worldwide, for sectoral agencies to *facilitate* better environmental compliance and performance of individual projects and more sustainable development of the sector as a whole.

4.3 The present review of national and international experience in the three selected sectors — industry, power and highways — also shows that sectoral institutions have a major facilitating role to play in managing the environmental impacts of sectoral projects, programs and development plans. While not providing a complete account of environmental impacts and opportunities linked to sectoral development and performance, this chapter summarizes the key issues highlighted by the three sector reviews.

The Role of Industrial Policy and Institutions

4.4 The important role of voluntary initiatives and approaches by industry stakeholders is well recognized and demonstrated by the Charter on Corporate Responsibility for Environmental Protection (CREP) — a product of collaborative effort between the industry and MoEF/CPCB. Also important is that the level of attention State institutions (responsible for the development, implementation and oversight of State industrial policies, such as departments of industry and industrial development authorities) give to promoting environmentally sound behavior by industries can have a significant influence on the subsequent environmental impacts from new investments and operating facilities.

4.5 This is elucidated by the industry sector case studies that revealed a relative difference in overall environmental performance of the two, in many ways alike, industrial estates in the two States where pollution control boards are similarly active and strong. The analysis showed that the difference is in part reflected in the level of environmental awareness and communication between regulators, industries/industry associations, and communities, and in part by the important role played by the State Industrial Policy, the Industrial Development Corporation and industrial associations (Box 4.1).

Box 4.1: Key Reasons for Relatively Better Environmental Management in Naroda Industrial Estate (as reported in focused group discussions)

- Proactive role was played by the Gujarat Pollution Control Board by creating regulatory incentives for industry to improve their environmental performance;
- Relatively better coordination among partners led to a reasonable level of performance of the common effluent treatment plant (CETP), as per the design;
- A number of industries in Naroda have benefited from advisory support from Gujarat Cleaner Production Center on cleaner technologies and production as well as best practices to improve environmental performance;
- The waste exchange program in Naroda improved sharing and access to information on environmental compliance of individual industries within the industrial estate and reduced the cost of compliance;
- Proactive Gujarat Industrial Policy 2003 issued in 2004 catalyzed improved environmental performance through financial incentives and an award for the industry that demonstrates exemplary application of cleaner production techniques in SME;
- Gujarat Ecological Commission provided a platform for NGOs to undertake scientific analyses and play an advocacy role;
- Naroda Industrial Association through its work has catalyzed enhanced accountability for each stake holding institutions, particularly the environmental regulators;
- A number of large and small scale industries (more in Naroda and a few in Patancheru) improved compliance by adopting voluntary environmental management system standards based on ISO 14001; and
- Several universities, research organizations, and private investors in Andhra Pradesh and Gujarat, as well as Naroda Industrial Association have demonstrated a successful business model through sharing of technical information on waste minimization to improve industrial productivity and operation of CETP and treatment, storage and disposal facility (TSDF).

Source: World Bank-CII Stakeholder Consultation workshop, Ahmedabad, July 2005

4.6 Both the Gujarat and Andhra Pradesh case studies also highlight the importance of and opportunities for industrial institutions, such as Industrial Development Authority (IDA), as well as estate management and business associations, to influence the environmental performance of individual industries and estates as a whole. One example is an initiative by the Naroda Industrial Association to introduce environmental auditing to improve the knowledge of resource utilization and generation of waste. Key opportunities, identified by the study, are summarized below.

Integrate Environmental Objectives in the State Industrial Policy

4.7 During the past decade India has seen the most significant reforms in industrial policy being implemented with support from a diverse range of sector institutions, both at the central and State level, triggering its economic growth. However, integration of environmental objectives in this process has lagged behind, and the current situation differs in various States. For example, the industrial policy of Gujarat boldly promotes good environmental performance, while some other States emphasize the need for "expeditious clearance of proposals" for development investments, without emphasizing the importance of ensuring that new investments should be made in an environmentally sustainable manner. It

would be important for the Ministry of Industry to raise awareness of "good practice" examples of integrating environmental provisions in the State-level policy, such as those of Gujarat or Maharashtra, and encourage all rapidly industrializing States to follow this approach.

Link Industrial Promotion to Environmental Performance

4.8 To promote and attract investments in the State, IDAs tend to offer attractive concessions and tax holidays to the project proponents in many cases without considering the environmental sensitivities of investments or their cumulative effect. This policy has led to a mixed variety of industries being attracted to the area affecting ancillary support industries, predominantly SMEs, which have little or no environmental facilities. For example, Gujarat has attracted significant investments for the production of dyes, dye intermediates, and textile processing in the small scale sector, which reportedly has led to significant contamination in the surface and ground waters and land environment. It is time for India to start integrating environmental considerations in industrial promotion incentives, using, for example, the instrument of environmental performance bonds, described in Chapter 3. In this case, IDAs would require certain type of companies, identified jointly with environmental authorities, to secure environmental performance bonds, to receive the concessions or tax holidays, or to obtain a license to set up the plant for particularly polluting processes. A particular opportunity, as well as a significant risk if this opportunity is neglected, is provided by the recent process of setting up Special Economic Zones[20] that could potentially house industries, commercial establishments and residential complexes with possible pressure on land and natural resources in these areas. Paying due attention to environmental considerations, opportunities to reduce the pressures through better planning and incentives to clean production in the process of establishing these zones and granting licenses will go a long way in harmonizing the growth and sustainability objectives.

Coordinate with Local Government and SPCB for Better Planning, Infrastructure Provision, and Zoning

4.9 The two areas selected for the case studies reflected the important role and results of the planning process. The case studies showed that many environmental issues found in the Patancheru industrial area (Andhra Pradesh), and to some extent in Naroda (Gujarat), related to inadequate planning, provision of environmental infrastructure and choice of location of the polluting industries. That the Naroda industrial estate was better planned and provided with better infrastructure, as compared to the Patencheru industrial estate, was a key factor in comparative environmental performance. However, for neither area was there evidence that an assessment was undertaken in advance to evaluate whether adequate infrastructure facilities (such as water supply, effluent treatment, hazardous waste management, sewage management) would be sufficient and available to ensure environment management and overall compliance.

[20] In 2000, the Government of India replaced the old Export Processing Zone regime by a new scheme of "Special Economic Zones" (SEZs) with several significant incentives/benefits that were not available in the earlier scheme. In 2005, it enacted the SEZ Act and the SEZ Rules were notified in February 2006. (*Source: Economic and Political weekly, November, 2006; "Special Economic Zones: Revisiting the Policy Debate")*

4.10 Traditionally, the planning process for the new industries started at the local level and was mostly driven by promoters with very little consideration to the environmental consequences of making a decision unless the site area had been declared environmentally sensitive. To address this pitfall, the spatial planning programs initiated by the CPCB and SPCBs, including the development of a zoning atlas, built-in a district-wise environmental assessment guideline for the siting of industries. The work has been extended to cover 142 districts in different States and union territories, and is expected to enable the planner to decide on the suitable areas and zones for new developmental projects. Although the zoning atlas is considered to be useful by many environmental planners at the State level, the use of information for actual siting of industries is still modest and uneven. There is an evident need to more effectively integrate the environmental zoning program by SPCBs with the State industrial development programs and locational decisions by IDAs using recent good practice examples from some States such as Andhra Pradesh where the Andhra Pradesh PCB has managed to start exercising a major role in industrial zoning.

Raise Awareness of Business Opportunities Linked to Good Environmental Management

4.11 Many industries, including SMEs, would volunteer to switch to better and cleaner production processes and technologies, if it also helps them reduce the costs of inputs, increase the value of output and increase the overall profit. For example, a cluster of export-oriented glass industries near Bangalore switched to gas-fueled boilers, resulting in drastic decrease in air emissions and significant reduction of glass rejection ratio, which compensated well for the cost of conversion. Another example is from the textile processing sector in Ludhiana, where a large number of small units adopted measures, such as changing processing machines, optimizing the washing/rinsing operations, and reducing the processing steps. These investments had a short pay back period, which is very important for SMEs in determining the need for such investments. The measures resulted in cost savings from reduction in the use of inputs including water, energy, dyestuff and chemicals. The majority of the measures also had a significant impact on reducing emissions[21].

4.12 While environmental protection is still viewed by many industries solely as a compliance issue, which needs to be managed to minimize the business risks of closure or public complaints, there are a growing number of examples — in India and internationally — of commercial opportunities and gains accompanying improved environmental performance. It is an important task and public duty of industrial agencies and associations to collect and effectively disseminate information to increase knowledge and awareness of commercial benefits from better environmental performance among investors and developers.

Foster Partnerships Between Larger Industries and Smaller Suppliers

4.13 It is evident that industrial associations and leaders in environmental performance among industries themselves are much better positioned than the environmental regulator to guide investors and developers to understand and realize business opportunities associated with improved environmental management (such as quality of products, waste reprocessing, energy efficiency). International experience has shown that SMEs are more likely to accept and adopt compliance measures where industrial associations provide the incentives and where large companies act as environmental mentors. The incentives are particularly strong

[21] Information collected by the study

and the chances for success higher when there is a direct business relationship between a mentor and a small business, such as in Mexico where small suppliers were responsible for mentoring (Box 4.2).

Box 4.2: "Greening Supply Chain" Initiatives

Supply chain management is an important factor which links three important concepts — business competitiveness, economic productivity, and environmental management. Greening of the supply chain is a growing industry concept that advocates the purchaser to use its purchasing power to demand improved environmental performance from the suppliers, which in many cases are SMEs, upstream in the supply chain. It is also implied that the purchaser, usually a large corporation, will play a facilitator's role towards its suppliers and help them in their efforts in adopting more environmental-friendly practices. The intended result is to create a trickle down effect throughout the supply chain in which the entire supply chain is motivated to become "green" or more environmentally friendly.

In Mexico, the Guadalajara Environmental Management Pilot was established to assist 20 SMEs to implement ISO 14001 environmental management systems by linking them with larger companies, to which they supplied their products, as a mentor support system. The core of the project was a series of trainings and review sessions where the basis of environmental management system elements were introduced and SMEs were shown how to feasibly implement them with the assistance of their mentors. Half the participating SMEs said they would not have participated in the program if they had been invited by the government or university, showing that the motivating factor was commercial ties with their major clients.

In India, the National Productivity Council as well as industrial associations and institutes in India have promoted this concept. For example, the Indian Institute of Materials Management has established a knowledge bank that promotes best practices on chain supply management.

Source: World Bank, 1998b; information from study consultations.

Expand the Role of Business Associations in Knowledge Sharing and Training

4.14 Many Indian industries have leveraged the knowledge of local and international practices (such as local substitutes for raw material or locally reuse/recycle some waste byproducts) to implement environmental management programs under the corporate social responsibility charter. The industrial associations, such as the Federation of Indian Chambers of Commerce (FICCI) and Confederation of Indian Industries (CII), have developed important initiatives to share best practices, provide compliance assistance and promote voluntary initiatives. For example, the Association of Chambers of Commerce and Industry (ASSOCHAM) and FICCI have organized workshops on ISO 14000, developed courses in internal auditing of environmental management systems, and provided technical assistance on pollution prevention and waste minimization. Both CII and FICCI have also developed programs targeting SMEs.

4.15 However, the role of these and other business associations in promoting good environmental performance as inherent part of good business practice is uneven across the States. A worrisome observation is that the poorer states with weaker government institutions where massive development with potentially significant environmental risks has now picked-up (for example, Chhattisgarh, Jharkhand and Orissa), have less active business associations with few environmentally friendly programs. Hence, many investors and developers in these States, who are emerging on a massive scale, have limited access to information on environment friendly technologies and management practices and business opportunities associated with their adoption. It is critical to support and expand the environmental

programs by the national and State business associations in those "emerging" States that are experiencing massive development investments.

Environment as a Driver in Power Sector Development

4.16 Environmental impacts of the power sector are wide-ranging, significant and in public spotlight: they are visible locally, whether it is a smoky stack, an ash pond, or a reservoir displacing a settlement; they cross boundaries of sovereign countries, as in case of acid rains; and lately, they have become of major global concern due to anticipated climate changes largely caused by carbon dioxide emissions from burning fuels (Box 4.3). It is also widely recognized that these impacts are a function of policies and institutional performance in both sectors — power and environment.

Box 4.3: Energy and Environmental Challenges: A Global Perspective

The way that energy and environmental challenges are addressed in the next two decades will, to a large degree, determine sustainable growth, environmental quality, and national security.

Climate change presents an additional challenge to economic development in general, and the energy sector in particular. To reduce the threat of human-induced climate change will require a significant reduction in the emissions of greenhouse gases globally, of which carbon dioxide is most significant. While Organization for Economic Cooperation and Development (OECD) countries will remain the largest per capita emitters of Greenhouse Gases (GHGs), the growth of carbon emissions in the next decades will come primarily from developing countries. The Inter-governmental Panel for Climate Change (IPCC) estimated that carbon emissions would increase by 2050 relative to 2000, globally by a factor of 1.6 to 3.5, and in developing countries by a factor of 2.3 to 5.2 in the absence of policies to address climate change and a transition to a low-carbon economy. Between 2020 and 2030 developing country emissions of carbon will exceed those of developed countries in aggregate but still lag far behind on a per capita basis.

Transformational policies and strategies will be needed to meet national expectations of secure, safe and clean energy and to deal with the implications of climate change. The energy sector accounts for about 80 percent of worlds' greenhouse gas emissions. The widespread commercialization of energy efficiency technologies is an effective strategy to both reduce local and regional air pollutants and address climate change without affecting economic growth as well as addressing energy security concerns. Although, energy intensities are declining due to structural changes, technological effects, and globalization, much remains to be done in transforming energy efficiency markets. Decisions taken today on technologies, particularly in the power sector, and policy will have profound consequences on development paths for 40 to 60 years. Carbon intensive energy infrastructure and energy inefficient cities that are being rapidly built and expanded today will perpetuate the pattern for carbon intensive development for decades. Policies and incentives that promote new, cleaner and more efficient technologies and the international aid to help developing countries reduce the cost, access and adopt cleaner technologies on a commercial scale would be critical.

(Source: World Bank, 2006a)

4.17 The main impacts on the environment from the power sector in India are defined by:

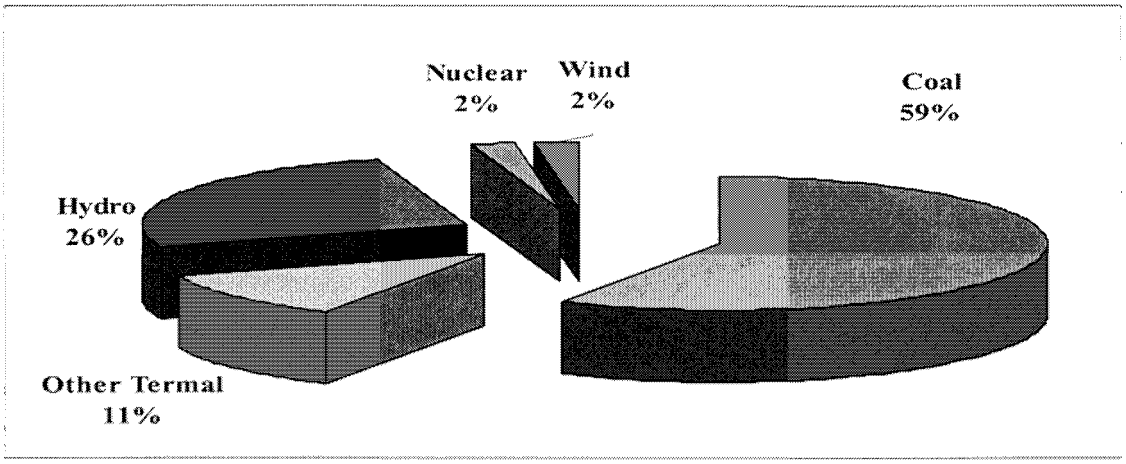
- Primary energy source and technology choices for power generation, which heavily relies on high ash-content coal (Figure 4.1);
- Sector governance and performance, particularly such indicators as high transmission and distribution (T&D) losses increasing the need for additional generation; erratic supply and outages, forcing users to resort to inferior back-up options; inadequate T&D networks preventing optimum utilization of generation

capacity; poor demand-side management; and bankrupt State-owned utilities unable to invest in modern technology and pollution control; and

- Environmental performance and compliance of individual facilities.

4.18 While India must vastly invest in generation, T&D, and reform of the power sector to overcome current supply shortages and provide electricity for all and meet future demands of the growing economy, it faces an additional challenge of increasing attention to the environmental implications of power generation technology choices at the local, regional and global levels. Furthermore, energy security has recently emerged as a priority area for India's development prospects. All of these point to a critical need for a long-term power sector development strategy that addresses, in a balanced manner, the issues of (i) meeting the growing demand for electricity at affordable cost; (ii) ensuring the security of primary energy supply through an appropriate mix of sources; and (iii) minimizing the environmental impacts.

Figure 4.1: Installed Capacity of Power Generation by Source (percentage), 2005



Source: MoP (2005)

4.19 Importantly, there is significant synergy between all these three objectives among the various areas of sector development recognized as a priority by the government, namely:

- Increasing the share of hydro, as opposed to coal, in new generation capacity addition
- Renovating and modernizing old coal-fired power plants, with the resulting improvement in operating efficiency and environmental performance
- Expanding the inter-regional transmission network, which would also enable the transfer of electricity from hydro power concentrated in north-east part of the country to other locations
- Upgrading inadequate and ageing sub-transmission and distribution networks contributing to power cuts and local failures, which in turn lead to increased use of back-up diesel generators that are inefficient and contributor significantly to local air pollution in urban areas, where significant numbers of people are exposure to their harmful impacts.

- Reducing T&D losses and theft, the scale of which is currently equal to new annual capacity addition.
- Promoting energy efficiency among end-users of electricity.
- Optimizing utilization of the existing generation capacity.
- Providing rural access through distributed generation based on renewable applications.

4.20 Progress in all these areas will be highly beneficial for both sectoral and environmental objectives. A series of earlier analyses of the long-term environmental issues in India's power sector at the national level and for selected States, conducted by the World Bank (World Bank, 1998a; 2004a; 2004b), demonstrated significant financial and environmental gains for unities from improved T&D performance and demand-side management incentives. This is consistent with evidence from other such studies undertaken in India and elsewhere.

4.21 Key sectoral priorities, as articulated by government documents, such as the Electricity Act 2003, the Energy Conservation Act (2001), the national Tenth Plan and major MoP programs (Renovation and Modernization (R&M) of coal power plants, Accelerated Power Reform and Development Program, etc.) appear reasonably consistent with the above environmental objectives. This reinforces the importance of overcoming a host of barriers — institutional, regulatory and financial — to proceed with these measures in practice. Paradoxically at first sight, current power shortages already associated with substantial economic, social and environmental costs have emerged as one of the main bottlenecks for realizing India's plans to cleaner power generation in the future (Box 4.4).

4.22 The three case studies, prepared for this report and involving a hydro power project, a coal fired power plant and a major high voltage transmission line (Box 1.2 in Chapter 1), indicated that environmental impacts can be reasonably managed in all these sub-sectors. It must be qualified that the case studies included relatively recent projects undertaken by large and financially strong central government corporations — the National Thermal Power Corporation (NTPC), the National Hydro Power Corporation (NHPC) and the Powergrid Corporation — that were able to comply with environmental regulations, as well as exercise a socially responsible approach.

Box 4.4: A Planned Transition to Cleaner Electricity Generation is Complicated by Severe Shortages of Power

While India is planning to increase the role of hydro, nuclear, and clean-coal technology within its energy mix, load shedding has put a premium on getting generation plants on line as quickly as possible. This naturally favors an approach of focusing on reliable, conventional coal-fired units, as supported by data below.

India's Tenth Plan envisions a shift to hydro power. Within the Ministry of Power (MoP) planning framework, about one-third of the planned capacity addition of 100,000 MW during the period 2002–2012 would be hydro, which would contribute to the shift. About half of the planned capacity would be thermal (most of which will be coal-fired), and the balance would be nuclear and non-hydro renewable. The majority of capacity additions are slated to come from the central sector and majority state-owned firms such as NTPC and NHPC. The balance is expected from state-level generators and the private sector.

In practice, the NTPC (the central sector thermal generator) has come closest to meeting its planned capacity addition target, and most of this capacity has been coal-fired. Overall, the country is likely to add about 75 percent of the planned 41,000 MW envisioned by 2007. This performance will likely leave India considerably short of *both* the 100,000 MW target for 2012 and the desired shift in the primary source mix towards a less import and coal dependent energy base, addressing energy security and environmental concerns.

Furthermore, power shortages are among key reasons for under-performance of India's Renovation and Modernization (R&M) program for coal power plants. One of the main barriers to R&M today is that many of the best candidates for R&M are owned by States that desperately depend on cheap power from these older plants for a significant portion of their overall supply and cannot afford a temporary shutdown of such a plant for R&M.

Source: MoP (2005) and Bank Staff

4.23 The Powergrid Corporation has adopted a comprehensive set of environmental and social policies that may exceed the requirements of the respective government policies and regulations (Box 4.5). For the Dhauliganga–Barrely transmission line going through ecologically sensitive areas of Uttar Pradesh and Uttaranchal, a "good practice" effort was made to conduct a preliminary survey for project alignment that would avoid developed areas, human settlements and cultural and historical places.

4.24 The Dadri Thermal Power Plant of the NTPC, that started commercial operations in 1995, was the first power plant in India using beneficiated coal. In combination with relatively advanced technologies and a good (ISO14001 certified) management system, the plant was able to meet the regulatory requirements with respect to the environmental impacts. Although clean (beneficiated) coal is more expensive, financial performance of the plant is better than many other coal power facilities. Nevertheless, ash disposal remains a challenge, and the case study highlighted the need for better technology and incentives for management of coal ash. Among the recent NTPC initiatives, a proposed plan to set up four ultra mega coal based power plants (of 4,000 MW each) using supercritical technology has the potential to demonstrate improved environmental management from both national and global perspectives.

4.25 As mentioned in Chapter 2, the Koldam hydropower project (also of the NTPC) sets a good practice example of working with the community. At the same time, the case study and further consultation with the hydropower developers emphasized the need for standard guidelines by the MoEF for environmental flow downstream of the dam/diversion structures

so that the impact of change of flow regime downstream on aquatic flora and fauna could be minimized.

Box 4.5: PowerGrid — Corporate Leadership in Sustainability

Powergrid Corporation of India Ltd. (PowerGrid) is one of the largest transmission utilities in the world playing a strategic role in the Indian power sector operating the national grid. PowerGrid is presently operating about 47,757 circuit km of transmission lines and 82 sub-stations having transformation capacity of 46,461 MVA.

Transmission projects are generally environmentally clean and non-polluting in nature and its impact on environment are restricted to only Right of Way. PowerGrid, has demonstrated its commitment to achieve the goal of **Sustainable Development** through implementation of a comprehensive ***"Environmental Social Policy & Procedures" (ESPP)*** based on the principles of **avoidance, minimization and mitigation.** The implementation of ESPP in all PowerGrid's projects has resulted in significant mainstreaming of environmental sustainability in its operations, particularly through:

Reducing deforestation. The data shows that the forest cover, which was about six percent of total 27,000 circuit km Line until 1998 has reduced to two percent with proactive and systematic approach in 20,500 circuit km line constructed during last six years.

Greening of PowerGrid sub station sites. PowerGrid has undertaken massive plantations in sub-stations areas and about 2 to 4 acres of land with suitable species of plants in almost each of their commissioned sub stations.

Provision for **rain water harvesting** and **collection** of even used/waste water for its conservation and recharging of ground water in all upcoming buildings and substations.

Protecting wild life through design modification: Adoption of an innovative tower design, such as multi-circuit and very tall towers, to protect wildlife and trees in ecologically sensitive (In Tehri transmission line tree felling is reduced to 14,739 against earlier estimated 90,000 trees in Rajaji National Park due to placing of 85 m high towers.) areas and providing financial assistance to state government/ institutions for conservation of flora and fauna.

Eliminated use of poly chlorinated biphenyls. PowerGrid has eliminated the use of poly chlorinated biphenyls, a known carcinogen, in all electrical equipment.

PowerGrid has initiated design and implementation of an integrated management systems, viz. **ISO 14001 for Environment Management, 18001 for Occupational Health & Safety and ISO 9001 for Quality management.**

(Source: PowerGrid website)

4.26 Summing up, there is some degree of convergence between sector development plans and environmental objectives. Furthermore, the same reforms in sector governance and incentives that would improve environmental performance are desperately needed for meeting the sector's own performance targets. At the same time, the sector review and case studies highlight a number of areas where further alignment of sectoral policies and programs with environmental considerations is required and can be done by the sector itself or in coordination with environmental authorities. These are listed below.

Develop a Consistent Framework for Integrating Environmental Externalities in Power System Planning and Investment Decisions

4.27 A framework for capturing environmental externalities, related to the power sector, has been evolving in India in response to specific environmental priorities. For example, India's coal has very high ash content and is very low in sulfur. This resulted in a decision to set source emission standards on ash (measured as SPM), but with no emission standard for

sulphur dioxide (SO_2). The emission standard is regulated by prescribing the height of the stack to ensure good dispersion. While there is no nitrogen oxides (NO_x) emission standard for coal-based power plants, NO_x emission norms for oil and natural gas-based power plants are more stringent in India than in many other countries. Companies wishing to use forested land had to pay the MoEF for afforestation of two hectares for every hectare of forest land lost. Resettlement and rehabilitation components associated with, inter alia, hydro and transmission projects are mandatory items.

4.28 The possible impact of the cumulative regulations on power sector technology choices have not been considered so far, nor is it expected to be done per initiative of the environmental authorities preoccupied with building and enforcing a reasonable multi-sectoral regulatory framework. These considerations come together in India's power generation planning process, where it remains a strong centrally planned impetus, provided by the Central Electricity Authority (CEA) for new capacity development by central government utilities. For a long time, however, the recognition of the role that environmental regulations might play in sector development plans was mute.

4.29 The issue of accounting for environmental externalities and incorporating those costs in the power planning process has come to the fore in India in October 30, 2002, with a Supreme Court ruling on a matter involving forest conservation and requiring the user agency (except for projects like clinics and schools) to pay the *Net Present Value (NPV)* for diverted forested land. The payment was set at Rs 580,000 – Rs 920,000 per hectare and *in addition* to the compensatory afforestation payment, which, as per latest revision, is set at about Rs 35,000 per hectare if land is provided by the developer, or up to double that amount if land is not provided.

4.30 The impact of the ruling was particularly felt by hydro projects, which are typically located in forest areas and could cause a large loss of forest land due to inundation, as well as land requirement for locating project facilities. The introduction of NPV was estimated to add 5–7 percent to the project costs, according to the National Hydro Power Corporation (NHPC)[22], affecting power tariffs and the viability of hydro power projects. Several public utilities petitioned against this order, emphasizing the extraordinary high amount of payment and double-counting with the payment for compensatory afforestation. In recognition of this controversy, a Committee, headed by Dr. Kanchan Chopra, was set up in September 2005 to review and update the methodology for NPV calculations, as well as recommend whether additional types of projects should be exempted from paying NPV. The Committee released the report in June 2006.[23]

4.31 The introduction of NPV has illustrated that environmental regulations can, and increasingly will, influence the cost structure for future generation and transmission projects. However, the ultimate impact of an environmental regulation on future power sector technology choices, in the short and long term, can be established only through a comprehensive and rigorous analysis. It is therefore critical that power planners are able to perform such an analysis and provide well-substantiated inputs to the MoEF and the Supreme Court on such matters.

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[22] Based on data for Arunachal and Sikkim projects

[23] Chopra Report on NPV. Source: http://iegindia.org/npvreport.pdf

4.32 Importantly, the impact of NPV on the cost structure of power projects highlighted a broader issue — the need for a comprehensive methodology that power planners and others in India could use for estimating all relevant externalities (and the economic costs and benefits) of alternative power sector technology choices at the project and system level. For example, one of the immediate concerns in the power sector was that the NPV payment could result in an unintended consequence of an even greater reliance on coal-fired power plants to meet future energy demand, which would ironically be detrimental to the environment. Therefore, a framework for accounting for externalities at the planning stage should make sure that the extent to which externalities are incorporated with the hydro development process is comparable to that for thermal power projects. (If the extent and rigor of integrating externalities in different types of power projects are different, the resulting power generation plan will be sub-optimal from both economic and environmental viewpoints.) The development of such a framework should also address the question of whether global climate change related externalities should be incorporated as well, and if so how these should be calculated. In the end, only a consistent consideration and integration of all these issues would lead to a system of environmental regulations that corrects the market for the development of new generation and transmission projects in a socially optimal manner.

4.33 The next issue is how exactly India's power generation planning and development process should adapt owing to the increased significance of environmental costs and benefits. The key questions to be considered are whether and how to incorporate identified cost and benefit streams within individual energy projects (implying that revenues to the project are sufficient to cover these costs, and that revenue streams from benefits are also established); which costs and benefits to recognize outside the project structure (and if so, who absorbs the costs or gains the benefits); and which costs and benefits to leave aside for future consideration; and what incentives, regulatory and/or financial, are to be provided to private investors to ensure optimal technology choices?[24]

4.34 To illustrate the last point, private developers in India's power generation increasingly use imported coal with higher sulfur content but are able to save on the cost of SO_2 control technology due to the lack of a source emission standard. In the situation when emission norms for NO_x for oil and natural gas-based power plants are quite stringent in India (more so than in many other countries) this situation would give coal-based generation an additional edge over "cleaner" fuel choices. It should be also noted that the average actual SO_2 emissions (1,200 mg/m^3) from power plants using Indian coal is less than the standard in the European Union (1,200–2,100 mg/m^3). Thus, setting such a standard in the future would not affect these plants while it would more effectively regulate pollution from the use of higher sulfur imported coal.

4.35 Power sector agencies, notably the MoP and CEA, have a natural advantage and a definite business need for developing capacity to analyze power system development plans and technology choices taking into account the entire range of environmental externalities. And, it would be beneficial for both the power sector and the environment if these agencies and the environmental authorities could work together on the appropriate system of environmental regulations and incentives, based on a good analysis of their impacts. An already existing example of a joint effort by MoEF/CPCB and power generators to build on

[24] A World Bank has supported a parallel study to analyze these issues and recommend possible approaches to addressing them.

is an agreement to a set of actions to improve environmental management and reduce pollution including greenhouse gas emissions under the CREP.

Intensify Efforts to Promote Energy Efficiency and Conservation

4.36 The Energy Conservation Act (2001) provides a sound, comprehensive regulatory framework which introduces both voluntary and mandatory programs for energy efficiency. However, implementation of the Act has been uneven and impeded by a prolonged process of making the Bureau of Energy Efficiency, established by the Act, fully operational. And while a wide range of energy efficiency initiatives are underway, energy conservation is still not a mainstream business concept in a country with perhaps the highest electricity tariffs for industrial users in the world (with unreliable power supply by utilities being, again, one of the counter factors). There is a definite need for a focused effort, backed by strong political commitment, to translate the ambitious provisions of the Act into an actual set of incentives and results on the ground.

4.37 A major project on assessing barriers and opportunities for energy efficiency in three countries — Brazil, China and India — has been undertaken by the joint United Nations Development Program (UNDP)–World Bank Energy Sector Management Assistance Program (ESMAP) in collaboration with United Nations Environment Program (UNEP). The key emerging recommendations of this assessment for India are summarized in Box 4.6.

Box 4.6: The Brazil–China–India Energy Efficiency Assessment: Recommendations for India

Adopt a more strategic approach to promoting energy efficiency: Against the backdrop of multiple initiatives and programs, there is a need to refocus on generating the best results in terms of actual energy efficiency gains. This would require a strong strategic review at the national level, involving the central Government, to assess priorities for work on energy efficiency development in the coming years, and to focus sustained, multi-year attention on the implementation of the policy initiatives and market-oriented investment mechanisms that can provide the biggest contributions. Such an integrated and strategic review would also be useful for establishing national priorities for support under current and new international clean energy and climate change initiatives. A review might begin at the macro level, assessing energy intensities and potential savings in different sectors, and the practical investment areas which could yield the biggest benefits. But the most important point would be to establish priorities for specific programs to generate the necessary investment.

Decide on the importance of Energy Service Companies (ESCOs) and support accordingly: ESCOs as well as energy auditors have made little progress so far. This is partially due to their small size and limited reach, and lack of credibility and relationships with other important actors. Support for these two groups whose prime business deals with energy efficiency and who could become important promoters of energy efficiency investments in India could contribute to increasing commercially-based energy efficiency investments. While ESCO development may or may not be considered a priority, past experience in India and elsewhere shows that India's ESCOs are unlikely to develop significantly without sustained government support, through ESCO market creation initiatives (perhaps through proposed public building energy efficiency initiatives) or other means.

Support the promising new energy efficiency lending businesses being developed by Indian banks. The launching of dedicated energy efficiency finance schemes by five major banks in India is a significant achievement. Several specific areas where follow-up efforts would yield significant returns include:

- Further assistance to the participating banks to refine and standardize loan applications/appraisal procedures, and minimize transaction costs. This requires specialized technical assistance to each individual bank and follow-up training assistance. Additional work on options to "ring fence" the negative incremental cost stream achieved in energy efficiency projects for partial use as loan security also would be beneficial.
- Intensive support to the local bank branches in marketing and refining their energy efficiency lending schemes. Much work remains to be done in disseminating information about these schemes to energy efficiency project developers and client enterprises. Further efforts are also required to improve capacities and the efficiency of arrangements for the technical assessment aspects of the lending schemes.

Provide sufficient flexibility to encourage business-driven initiatives. Finally, it is important to emphasize that while government support for energy efficiency is required, it should not result in the government stifling the activities of other actors by telling them what type of energy efficiency schemes to formulate or end-user segments to target. Actors on the ground need to make their own decisions based on their business objectives.

(Source: World Bank, 2006b)

Strengthen Energy Efficiency and Environmental Considerations in Upgrading Old and Constructing New Coal Power Plants

4.38 Of the 83 coal plants in India, 31 are yet to comply with the national emissions standards and 27 are yet to comply with the effluent standards. These plants are old, in poor condition and typically owned by cash-strapped State government utilities. The Government of India's Renovation and Modernization (R&M) program to rehabilitate and upgrade such plants has been implemented for about 20 years, since the Seventh Five-Year Plan. At the

initial stage, the progress was good; however, over time, R&M requirements have increased rapidly (in part due to environmental regulations) and the implementation of R&M schemes has slowed down for several reasons. Of the Tenth Plan (2002–2007) target of 10,400 MW, less than 20 percent has been completed or undertaken by the end of 2005. India's nodal technical and planning agency, the CEA, estimates that up to 30,000 MW of the capacity base is in urgent need of rehabilitation now or in the near future.

4.39 While it is critical to urgently address a set of barriers to speeding up the program, it is also important to use an opportunity, provided by the program, for greater integration of energy efficiency and environmental considerations. For the past and planned R&M, the primary criterion is capacity enhancement and life extension while any energy efficiency improvement achieved is incidental and not a criterion for R&M project design. Nor does this major investment program, which will define the performance of the renovated plants for the future, attempt to consider and address the likely future trends in environmental regulations, which are being continuously expanded and tightened for the power sectors around the world.

4.40 Undoubtedly, this cannot be achieved without a supportive regulatory environment and financial incentives. Therefore, it is necessary to work out suitable packages of financial support, technical assistance and regulatory incentives to eligible utilities that would promote additional enhancements in energy efficiency and/or environmental performance. Given the synergy between these enhancements and mitigation of greenhouse gas emission, this should be a key area of focus for exploring and utilizing, to the extent possible, opportunities provided by global climate change financing instruments, such as Carbon Finance.

4.41 Building new coal-fired power plants is another opportunity to adhere to stricter energy efficiency and environment performance standards that address heightened — within India and internationally — environmental concerns about local and global impacts. For this, again, it would be important to develop and pursue a strategy of maximizing access to concessional funding instruments that are available to cover the incremental cost of a higher efficiency and cleaner technology.

Enable Better Ash Management

4.42 The Dadri thermal power plant case study highlighted that ash management is a challenge even for a modern facility using beneficiated coal. It is estimated that approximately one acre per MW of installed thermal capacity is required for ash disposal. The CPCB and MoEF have taken a number of initiatives to address this, including promoting the use of Pozzolena cement; collection of dry ash directly from electrostatic precipitator hopper; promoting high concentration slurry disposal; back filling of ash in used coal mines; and encouraging the use of fly ash in road construction and brick industry. Specifically, the Fly Ash Notification (1999) by MoEF promotes use of fly ash in the manufacture of building materials and construction activity (within a specified radius of coal or lignite based power plant); and mandates the use of only washed or beneficiated coal by thermal plants located beyond 1,000 km from the pit head.

4.43 Various thermal generation stations of the NTPC are taking measures to minimize the land requirements for ash disposal resulting from ash utilization, such as by raising the height of ash dyke using fly ash or giving it to cement manufacturers, wherever possible. The Dadri plant has taken some innovative steps to minimize the land requirement by using only about 480 acres of land (for 840 acre) for disposal of fly ash and plans to utilize about 0.1 million tons of fly ash per annum through a brick making plant, resulting in savings of approximately

one acre of land per year. The implementation of this rule on a wider scale is, however, constrained by the lack of enforcement mechanisms and incentives for many power plants (particularly those State-owned utilities that acquired large areas of government land at low cost) to dispose of fly ash at no charge. On the other hand, an incentive for construction companies to collect ash greatly depends on plant location. Developing specific sectoral guidelines in support of this notification and providing special incentives for remotely located power plants to follow those would be an important contribution to minimizing the environmental impacts of coal-based generation.

4.44 Land requirements for ash disposal and carbon dioxide emissions are likely to be the two main long-term issues for power generation growth in India, continued to be dominated by high ash content coal. These two issues, while sounding very different, are closely linked in India: the high ash content of coal available in India does not lend itself to a wide use of very high efficiency technology (such as ultra super-critical and Integrated Gasification Combined Cycle (IGCC) technology), which can help capture carbon emissions, unless there is a breakthrough in R&D. There are significant financial costs associated with any further option for making Indian coal and power generated from its burning cleaner (across a range of effects over a life cycle) and being less carbon intensive. This brings to fore the importance of strategic R&D efforts that would take into account the cost and benefits of removal of ash at various stages of coal production and processing chain, to maximize the full range of benefits, including reduced land requirements, local pollution effects and carbon emissions.

Improve the Regulatory Environment for Renewable Energy

4.45 India is the only country with a dedicated Ministry for Non-conversional Energy Sources (MNES) and has a distinguished record of promoting renewable energy, particularly wind power. The importance of renewably energy for India's development is emphasized by a growing recognition, as articulated in the draft Renewable Energy Policy (made available for public comment in 2005), that achieving universal electrification would be difficult without a greater use of distributed generation options using indigenous resources available to remote communities. There is a need to finalize the Renewable Energy Policy consistent with the country's broader environmental agenda. Another important area of action is to build capacity of State-level electricity regulators for setting transparent rules for renewable energy providers, who currently experience significant regulatory uncertainty resulting in a negative impact on the industry. An independent analysis of the relative "true" economic costs and benefits of renewable and conventional generation would be useful to support individual State regulators in determining "fair" prices for renewable energy.

Maximize Opportunities Provided by the Environmental Agenda to Support the Development of a Modern and Efficient Power Sector

4.46 Increasing attention to environmental impacts of the power sector, particularly global, can be, and often is, considered as a competing consideration diverting attention from more important sector issues. *It does not need to be so.* First, the multiple synergies articulated above suggest that the protection of the environment should be seen as an additional impetus, rather than a constraint to achieving the very objectives the sector has set for itself. Secondly, environmental requirements often act as an important motivation for technological innovation, energy conservation and management improvements that, in the longer-term, become very beneficial for sector performance. Third, the global climate change agenda in

particular provides an opportunity to seek and use grant-based and other concessional climate change financing instruments, along with knowledge, technical assistance and technology transfer, in a manner that reinforces and advances sector development objectives and national environmental priorities, such as energy efficiency, enhanced R&M of coal power plants or a greater use of renewable resources.

4.47 For example, India represents one of the largest potential markets for low-cost carbon-reducing investments. It is currently one of the three largest potential suppliers of carbon credits to buyers around the world, under the Clean Development Mechanism (CDM), introduced by the Kyoto Protocol. Most of these measures/projects also produce benefits that further India's national development and environmental objectives, which the application of global environmental financing instruments can help facilitate.

4.48 Furthermore, following a meeting of G-8 countries in summer 2005, attended by India, the International Energy Agency (IEA) and the World Bank were requested to develop, in collaboration with other International Financial Institutions, an "investment framework" for promoting cleaner production and use of energy. This request recognizes that the magnitude of financing needs, required for such a shift to cleaner energy on a large scale, is likely to exceed greatly the resources currently available from existing instruments, such as CDM, Carbon Finance, facilitated by the World Bank, and the Global Environment Facility (GEF). *The Investment Framework for Clean Energy and Development*, expected to be developed over the next two years with the help of country-specific consultations and in-depth analyses, is intended to accelerate investment so that countries, such as India, can meet their energy demands for growth and poverty alleviation in an environmentally sustainable way. It is therefore important for government agencies and private sector players in India to be an active participant of this process, *influencing* its outcome. This also highlights the importance of a strategic assessment of options, specific to India, to maximize synergies between lowering the carbon intensity of the economy, accelerating the rate of growth, enhancing energy efficiency and supporting the core objectives of power sector development.

Facilitate Environmentally and Socially Responsible Performance by All Actors in the Sector

4.49 Attitude, attention and initiatives by key government institutions dealing with the power sector at the national and State levels are among the key determinants of environmental performance by developers and operators of the facilities. For further improving environmental performance, the following additional specific recommendations are made:

- *Develop sectoral guidelines* for establishing transparent and accountable processes and procedures for interaction with the community and taking their views into account on key aspects of the project affecting their lives, such as acquisition of land;
- *Facilitate access to and sharing of international and national best practices* in key environmental management areas where major technical challenges remain, such as blasting, soil erosion and tunneling for hydro plants, ash control and handling for thermal plants;
- *Encourage a wider adoption of social corporate responsibility policies* that would include environmental policies and ISO 14001 certification; and

- *Improve management and disclosure of environmental information* related to the sector. Given the range and importance of environmental issues in the sector, a computerized environmental database and data management system, adapted to sector needs, could be developed and maintained by the MoP/CEA, in collaboration with MoEF/CPCB, as part of the MoP regular information database. The data would be used for power generation system planning needs, discussed above, and benchmarking and tracking progress on key indicators relevant to sector performance. Some of the key environmental performance indicators could be also made available online and included in MoP annual reports, which currently omit environmental information.

Building Highways in an Environmentally Sustainable Way

4.50 Over the past (approximately ten) years, environment management in the highways sector has been increasingly addressed as an important component of sector development. Highways design and construction practices have provided opportunities for mobility and safety improvements, as well as social and environmental enhancements to address community concerns. The high priority attached to the sector by the GoI, substantial support to State-wide and national-level efforts by multi-national aid agencies, such as the World Bank and the Asian Development Bank (ADB) with their attention to environment and social considerations, and parallel strengthening of the MoEF's Environmental Assessment (EA) clearance have all further increased awareness and incentive within implementing agencies to address these issues. The value of integrating the EA process has begun to demonstrate a growing number of good practices, such as an example from Gujarat (Box 4.7).

4.51 The current Road Transport Policy gives serious attention to environmental issues and attempts to correlate highways development with wider impacts than just "pollution". It acknowledges the impacts of multiple contributors beyond narrowly defined roads or highways construction, including energy and land demand, congestion and hazards. As described in Box 4.8, the Policy mentions the induction of new technology and upgradation of existing ones to reduce fuel consumption and pollution highlighting a cross-sectoral process.

4.52 *Operationalizing* the policy provisions remains a significant challenge as the procedures have not been clearly spelt out for either the project proponent or the regulator. Some important factors such as land-use and occupational changes, impoverishment, rehabilitation, water-logging and long-term environmental impacts that might require cross-sectoral and cross-boundary considerations have not been included. The onus to ensure that these are addressed is on the MoEF through the EA clearance process vis-à-vis the MoRTH's own planning and execution processes.

4.53 The mandates of various policies, including environmental acts, address the above stated issues in limited ways. Most of the applicable environment regulations, for example, the rules regarding noise, air, coastal zones, environmental impact, use of fly ash, and plantations, address direct impacts on a sectoral basis. As a result, ambiguities have emerged with respect to the identification and management of *indirect* impacts, such as the degradation of surface water quality by the erosion of land cleared as a result of a new road, and particularly *induced* impacts of development, such as increased deforestation of an area stemming from easier/more profitable transportation of timber and produce to markets. These

impacts are more difficult to measure and over time can lead to irreversible changes affecting larger geographical areas than anticipated.

Box 4.7: Internalizing Environment and Social Processes in Road Projects
The Gujarat State Highway Project (GSHP) Implementation Experience

As the benefits of implementing the Environmental Management Plan became more visible on ground, the interest and attention from decision makers, engineers, local leaders and communities towards environment and social management aspects increased. With progress in project implementation, it became increasingly clear that such measures substantially reduce resistance, help in generating support from local authorities and the public during construction, reduce project delays and enhance the over-all benefits of the project.

It was felt that with systematic efforts and minimal resources (most of which are a part of the contractual obligations), such measures generate tremendous goodwill, appreciation and support from the communities in general and local leadership in particular. This can be achieved through better integration of the environment and social management practices into planning, design and construction of civil activities.

This realization eventually garnered itself into the 'Vision and Achievements Document' of Roads and Buildings Department, Government of Gujarat (GoG) published in 2003. Two separate statements, one on 'environment' (Mother Earth) and the other on 'social' (People Matter) aspects were made a part of the document titled 'Road to the Future' — a reflection of awareness and commitment of the GoG in recognizing the importance of such practices in the developmental works.

To advance this initiative further, the GoG initiated a training program, under which more than 500 engineers have already been trained. Awareness generation and basic training including field exposure has been introduced as a part of all the training programs conducted by the Staff Training College, Gandhinagar. Environment and social management modules were introduced four years back and will continue to be a part of the training agenda in all future programs as well.

The experience gained from implementing the Gujarat State Highways Project (GSHP) and Gujarat Emergency Earthquake Reconstruction Project (GEERP) is also being used to develop an Environment and Social Management Framework (Guidelines) for planning, construction and maintenance of roads in the state. The Roads and Buildings Department has also established a Policy and Planning Unit (PPU) staffed with multi-disciplinary expertise and has confirmed that the Environment Management Unit, created under the GSHP will be a permanent feature in its organizational set-up. The two units will take forward environment and social management initiatives in other projects as well. An Environment Information System (EIS) has also been created under the Gujarat Road Management System (GRMS), which will be used in planning and designing all future road projects in the state. Initial operation of this system has begun with data collection for all state highways in five pilot districts.

These efforts are being made to ensure that at least some of the 'good practices' learnt or developed during implementation of external funded projects are internalized in the longer run and do not become limited achievements in specific projects.

(Source: Bank staff and Project Implementation Unit, GSHP)

Box 4.8: Environmental Intervention in the National Road Transport Policy

The National Road Transport Policy addresses environment considerations in the following manner: "In the Road Transport Sector, energy planning has a special significance, because transport is the second largest consumer of energy. The growth of transport not only leads to pressure on limited availability of non-renewable energy but also gives rise to broader environmental issues. As the demand for transport services rises, it leads to increased use of scarce land and contributes greatly to atmospheric pollution. Sound pollution and road congestion are other environmental hazards due to transport. It is therefore, necessary that environmental concerns should be built into road infrastructure project planning at the beginning itself, i.e. at the stage of site selection or alignment finalization. The government is aware of these concerns and has mandated that all road infrastructure projects require environmental clearance before they are taken up."

(Source: MoRTH website, http://morth.nic.in)

4.54 Recognizing some of these ambiguities, the MoEF has issued Gazette notifications and Circulars regarding the highways sector, which have resulted in guidelines and some codes of practices by MoRTH. Assessment of real-life experiences shows, however, that their effectiveness is often compromised by subjective application, open-ended interpretation, lack of quality control, and outdated/irregular revisions, as well as lack of incentives for contractors to translate the EIA and Environmental Management Plan (EMP) provisions into engineering designs and construction plans. Several recommendations have emerged from the study to address these challenges and shortcomings.

Strengthen Mechanisms, at Both Policy and Implementation Levels, for Better Accounting of the Indirect, Induced Cross-sectoral and Cross-boundary Impacts

4.55 These aspects are particularly significant for linear highways projects that extend over large ecological and administrative boundaries. Many of these impacts have not been documented or studied in detail in India and information about international practices available with regulatory and monitoring agencies remains sketchy. Therefore, it is useful to review practical mechanisms adopted by other countries and emerging from best practices in India, for dealing with these issues and develop approaches suitable to India. Some of the good international practices in this area are summarized in Box 4.9.

Box 4.9: Institutional Mechanisms to Promote Comprehensive Integration of Environmental Impacts in Highways Development — International Good Practice

United States. The Federal Highway Administration (FHWA) is a major agency of the United States. Department of Transportation (DoT). FHWA has the broad responsibility to ensure that transportation system plans, technologies, and innovations improve safety of the public and the human and natural environments, and that the decision processes include the full and open participation of the public. The National Environmental Policy Act (NEPA) of 1969 directs Federal agencies, when planning projects or issuing permits, to conduct environmental reviews to consider the potential impacts on the environment by their proposed actions. Environmental reviews involve an interdisciplinary and interagency process, including inputs from the public, as well as from other agencies, to guarantee that all environmental protection (as well as other) issues are addressed. FHWA and its partners have made substantial contributions to the environment and communities, through planning and programs that support wetland banking, habitat restoration, historic preservation, air quality improvements, bicycle and pedestrian facilities, context-sensitive solutions, wildlife crossings, public and tribal government involvement, and more.

These principles have been operationalized within FHWA through the Vital Few Goals (VFG) that tightly interlink environmental stewardship and streamlining to improve project delivery without compromising environmental protection while addressing the mobility and safety needs of the public. VFG sets expectations, measures, and methods for advancing an improved and efficient environmental review process. At the systems level this is accomplished through earlier and better coordination of environmental concerns during the transportation planning process. At the project level, such integration can be enhanced through the application of context sensitive solutions. This challenges all state transportation agencies and Federal Lands Highway (FLH) divisions to reach beyond their normal processes at the systems planning or project level, and to search for solutions that demonstrate an improved compatibility between the natural and 'built' environments.

Australia. The Department of Main Roads, Australia, through its Environment Policy, commits to managing the road network to optimize environmental outcomes for natural, human and built environments. The department uses knowledge of the actual and potential impacts of road infrastructure on these environments during planning, design, construction, and maintenance phases. Continuous improvement in environmental performance is sought by developing and implementing management systems and integrating environmental processes within general management practices; monitoring, reviewing and reporting on environmental performance; providing appropriate environmental resources; delivering environmental awareness training; developing and implementing environmental practices which minimize predicted impacts; consulting with the public and other stakeholders to provide for well-informed decision making. To achieve this, Main Roads employs a multi-disciplinary team of environmental scientists, environmental engineers, environmental planners, landscape architects, cultural heritage and re-vegetation officers state wide. These officers are located in district, regional, corporate and commercial positions. In addition, recognizing the value of continuous engagement with stakeholders, and correlating the same with sustainable project designs, the department has developed a specific manual on "Community Engagement" policy, standards, and principles with detailed guidelines for all levels of staff to implement and achieve these standards. These publications assist with the day-to-day running of the department and provide external stakeholders with information about the department including how to manage environmental requirements. The department also has an exhaustive Road Planning and Design manual which includes environment and social elements.

Provide Technical Guidance on Environment Management through Sectoral Guidelines

4.56 A need for good sectoral guidelines on various aspects of environmental management has emerged very strongly to overcome the "environment knowledge gap" that exists within the sector. Existing guidelines (such as the Indian Roads Congress (IRC): Guideline on

conducting EA) are limited in coverage and outdated. There is a need for a more comprehensive set of guidelines developed on the basis of sound technical research and implementation experience. The effort could be led by MoRTH, in coordination or through IRC or Center Road Research Institute (CRRI), and with guidance from MoEF. A parallel can be drawn with The American Association of State Highway and Transportation Officials (AASHTO) in the United States in the context of promoting technical excellence at the national level through highways associations.

4.57 A list of issues, identified by sector review and consultations, where guidelines will be helpful, includes:

- Public consultation and community engagement;
- Health and safety of highway construction workers;
- Integrating environment management in the project cycle, to better integrate EMP in project designs as well as methodology for assessing cumulative and induced impacts;
- Spot-checking storage, transportation, and use of explosives; disposal of bituminous waste based on studies of decay and transport characteristics; use of fly ash and other waste materials in road construction with appropriate safeguards;
- Restoration of borrow areas; environment management measures for bridge and tunnel works; and
- Protection of water courses and water bodies, wildlife areas and eco-sensitive regions; relocation and enhancement of cultural and common properties, in coordination with the Archaeological Survey of India (ASI).

Strengthen Contract Provisions to Improve Environmental Performance of Contractors

4.58 A major part of the EMPs in highways projects address construction related impacts and are often of great importance. The primary responsibility to implement these parts of EMPs lies with the contractors. EMPs are normally attached with the contract documents. However, most contractors view EMPs as an add-on, and their focus is in implementing the main body of works specified in the contracts, which constitute general and specific conditions of a contract, conditions of particular application, Ministry of Road Transport & Highways (MoRTH) technical specifications, relevant and referred IRC codes and guidelines, and the bill of quantities. Most of these conditions, specifications, codes and guidelines do not have adequate provisions for environmental management, do not necessitate proper implementation of EMPs, and sometimes may conflict with the provisions of EMPs.

4.59 Thus, there is a substantial scope for including environmental provisions in these specifications, codes and other contract mechanisms that would improve and streamline the implementation of EMPs and the overall construction process. For example, mainstreaming environmental management measures in the main construction documents and contract management procedures will mean that the need for preparing EMPs for typical construction-related impacts will be obliterated. Such impacts would then be addressed through the regular management of contracts, while EMPs could then focus on additional impacts, if any.

4.60 The following specific actions are recommended:

- Establish a system of periodic revision of old IRC codes, to bring them up to date with technology development in the sector;
- Strengthen and integrate environment management measures in the IRC codes and the MoRTH technical specifications using experience with implementing EMPs (Box 4.10);
- Develop new IRC codes/guidelines in consultation with expert technical institutions to guide preparation of projects to integrate environmental concerns, so that the conflicts between implementation of engineering designs and EMPs could be avoided;
- Introduce an environment checklist to help ensure that all required environment related items are included in the Bills of Quantities; and
- Develop a specific manual explaining how EMPs would be translated in contract clauses, and integrated in the contract documents. For example, a contract condition could include recovery of payments for non performance of EMP activities.

Box 4.10: Integrating Environment Management Measures in Construction Codes and Technical Specifications

National Rural Roads Development Agency. As part of the World Bank-supported Rural Roads Project, implementing agencies in four states have begun to utilize environment management tools such as Environment and Social Management Framework and Environment Codes of Practices (ECOPs) since end-2004. For understanding and improved utilization of these instruments in the field, during project preparation and implementation, targeted training is being provided to implementing agency staff in all the states. Another separate but encouraging development is that the latest revision (February 2005) of the Operations Manual for the entire National Rural Roads Programme (Pradhan Mantri Gram Sadak Yojana) includes the salient features of many of the ECOPs, most importantly the transect walk.

Karnataka Public Works Department. The Departmental Code of the of the PWD has been recently augmented to address environmental issues arising out of construction of roads, bridges and buildings by responding appropriately during design, construction and operation and maintenance phases. It aims at (i) providing details of environmental management aspects of PWD projects; (ii) minimizing adverse environmental impacts of projects by environmental screening and management framework; (iii) encouraging good construction practices; (iv) ensuring compliance with the statutory requirements; and (v) carrying out environmental monitoring.

Access to Training, Knowledge and Capacity Enhancement

4.61 The study identified several priority areas for strengthening the role of highways sector agencies in building the knowledge base and technical capacity to minimizing the environmental impacts in the sector projects. To carry these out, an increased allocation of manpower and resources within highways agencies to environmental issues would be necessary. Specific recommendations include the following:

- Facilitate the development of the national quality standards for services and products to be delivered in the highways sector;

- Strengthen the documentation and dissemination of relevant good practices and research findings;
- Initiate certification and accreditation programs on environment and associated construction management;
- Strengthen capacity of existing academic institutions that specialize in Environmental Management Training for the highways sector, such as National Institute for Training of Highway Engineers (NITHE) and Central Road Research Institute (CRRI), to provide high quality and well rounded environment training of international standard at low cost;
- Impart training on environmental management curriculum drafted by NITHE and/or CRRI with inputs from the MoEF on regulatory aspects through local and regional institutions such as the Staff Training Colleges;
- Perform periodic audits of environmental management in projects under implementation focusing on replicating good practices with the help of academic institutions and/or planning/quality control divisions of implementing agencies with participation from regulatory agencies, wherever appropriate; and
- Strengthen and influence highways and civil engineering curriculum on environment management in national technical institutions.

Addressing Cross-sectoral Challenges

4.62 All reviews and case studies highlighted that the lack of effective mechanisms for inter-agency coordination is too often at the root of environmental management problems, including difficulties with compliance and enforcement. While formulating a new environmental regulation, the draft regulation is sent to other concerned ministries as well as to Planning Commission for comments and inputs. However, more cross-sectoral co-ordination is needed in implementation and enforcement of regulations. Majority of sector experts suggest that improved coordination between sector agencies and environmental authorities early in the planning process could immensely enhance the environmental sustainability of sector investments as well as make better investments in environmental infrastructure.

4.63 The two case studies in the industry sector particularly highlight the importance of cross-sectoral coordination during the decision-making process for the siting of industries, which are typically the responsibility of State Industrial Development Corporations. When environmental institutions are consulted much later in the process after the planning is complete (which has happened in most cases so far), only marginal improvement can be made, if any, and most cost-effective opportunities to ensure long term sustainability of environmental resources in the area get missed. There are also numerous examples from the highways sector of the critical need for, and significant benefits from, improved collaboration between sectoral and environmental agencies.

4.64 One example that emerged from the two sectors (i.e. power and highways) when cross-sectoral collaboration could enable *compliance* with environmental regulations relates to fly ash management. To facilitate the implementation of the Fly Ash Notification by the MoEF (1999), both the power sector and highways authorities could provide some regulatory incentives to dispose of and collect fly ash respectively, as well as necessary technical

support. A good practice example is provided by the Allahabad Bypass Project — a four to six lane expressway, approximately 90 km long. The EMP of this project includes appropriate mitigation measures for handling ash, developed with the help of the Fly Ash Cell in NTPC, while contract provisions ensure the use of ash in its construction. Providing the right set of incentives, facilitation and oversight, developed jointly by both sectors, to ensure large-scale replication of such approaches would be necessary.

4.65 It is therefore important for both sectoral and environmental authorities to evaluate, share and promote national best practice examples of policies and institutional mechanisms in the planning and design of infrastructure and industrial projects that enable early and meaningful participation of environmental agencies in the project planning cycle. Some of the good examples are the Environment and Social Management Framework for the Highways Sector in Gujarat and industrial zoning efforts in Andhra Pradesh. It is also important to increase the level of consultation and coordination with sectoral agencies in drafting the environmental rules and regulations concerning their sector activities, including specific agreements on their roles and responsibilities in facilitating implementation and enforcement.

The Role of Local Governments

4.66 New priorities and programs, such as urban air quality action plans or other area-wise pollution management programs, will require even greater cross-sectoral cooperation and integration. There is an obvious need for formal institutional mechanisms for such integration; however these cannot be easily created. Consultations during the study conveyed a very strong message from experience that creating new institutions (including various inter-sectoral committees) is generally not effective and must be avoided. It is thus important to align the development and implementation of new area-wise or/and multi-sectoral environmental programs with on-going institutional processes. The decentralization process set in motion by the 73rd and 74th Constitutional amendments appears the best fit and the best hope for delivering on location (city)-specific area-based environmental management programs.

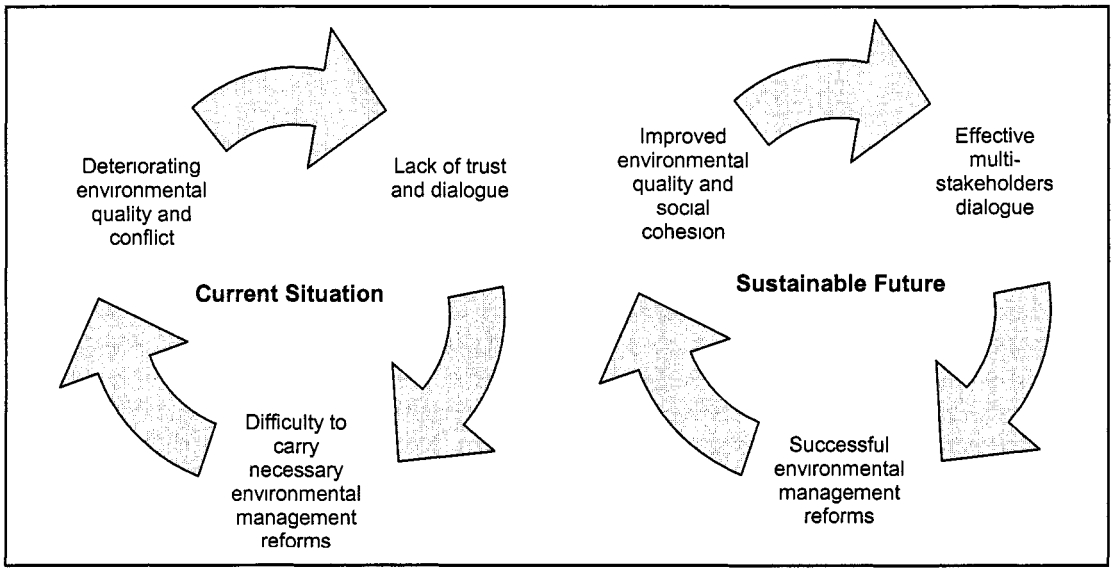
4.67 On a larger scale of replication, cross-sectoral integration and coordination for better environmental management, such as of the scope and depth envisioned by the area-based pollution management approaches (discussed in Chapter 3), would not be possible without a greater empowerment and involvement of local government bodies, as the 73rd and 74th Constitutional amendments dictate. Several examples from the highways sectors highlighted that the cooperation of local bodies was necessary for the control of land use, safe disposal of waste materials; prevention of accidents that cause spillage of chemicals on the road side; community-led road safety; land allotment for social amenities, recreation and location of ideal sites for bus stands and markets; information boards for locally important features; and equitable utilization of benefits from the road. Devolving more powers to and building capacity of local governments for developing and implementing environmental management programs aimed at measurable improvement of environmental quality in the areas of their jurisdiction, with the participation of all concerned sectors as well as citizens, would pave a vital road into an environmentally sustainable future.

V. Towards a Sustainable Growth Framework Incentives

5.1. Given the high population density, vulnerable ecology, extreme climate and a significant share of the economy heavily dependent on the natural resource base, **environmental sustainability might well be the next greatest challenge along India's development path**, adding to the list of priority needs to reduce disparity, eliminate poverty and promote social cohesion. As the country finds itself into the second phase of robust growth, making and further projecting massive investments in infrastructure, urban development, mining and pollution intensive industry, the issues of environmental management are coming to the forefront of public attention.[25]

5.2. While pressure for change and more effective action is building up and being recognized, albeit to varying degrees at all levels and by all players, there is a serious breakdown in public trust and constructive dialogue with respect to addressing a very complex and non-trivial set of issues. Increasing confrontation and suspense make the much needed environmental management reforms difficult to agree on and implement, further exacerbating environmental problems and creating a vicious circle. There is **an urgent need to start working towards developing a commonly shared vision on the way forward**; involving all principal stakeholders and reconciling different perspectives in a virtual circle (Figure 5.1).

Figure 5.1: From a Vicious Circle of Confrontation to a Virtual Circle of Sustainability



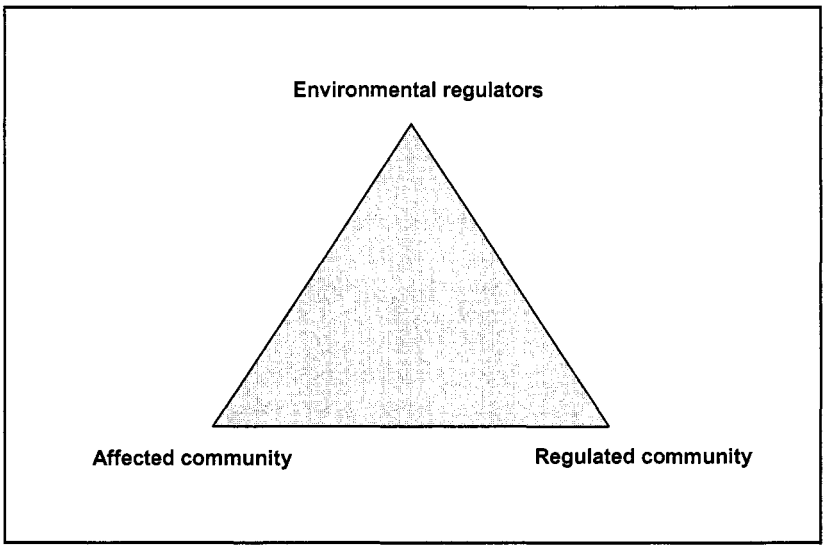
5.3. One of the first and key recommendations is to **carefully plan and execute a long term national program for supporting public participation in environmental management** aimed at educating and building capacity of all stakeholders involved. One specific action area is to develop detailed guidelines, as well as provide training, for public

[25] This has been a message from extensive discussions and consultations during the study will all three sectors, whose representatives unanimously conveyed that "the environment" for making investments and doing business today is very different from that 10–15 years ago, on account to much larger sensitivities over environmental and social issues.

participation for both State-level environmental authorities [Departments of Environment (DoE)/State Pollution Control Boards (SPCBs)] and sectoral agencies (adjusted to sector's specifics). Furthermore, most serious attention should be given to: (i) **building civil society's capacity to understand** the environmental issues and linkages to sector activities, to effectively engage in public participation forums; and (ii) promote **innovative and more interactive approaches** to public participation that increase public ownership of environmental actions. One such example, already piloted in India, is the citizen involvement in environmental monitoring and enforcement, which should be further supported.

5.4. This fundamental notion of **shared ownership of and responsibility for environmental action**, illustrated by Figure 5.2, is currently challenged by the general perception among many stakeholders — the public, project proponents, and development authorities — that the environmental ills are the sole responsibility of the environmental regulators (represented by the Ministry of Environment an Forests (MoEF), Central Pollution Control Board (CPCB), State DoE, and SPCBs) failing to effectively implement and enforce the laws. The study shows, however, that unless an increasing public demand for better performance by the environmental regulatory agencies is matched by adequate support to these agencies, conditioned on institutional reforms to increase efficiency, transparency and accountability, it would be naïve to expect substantial progress and unfair to solely blame the regulator for the lack of it.

Figure 5.2: Institutional Triangle of Environmental Management



5.5. There is a large unfinished agenda **to strengthen the regulatory, enforcement and incentive mechanisms available with environmental agencies**. The current application of environmental regulation does not match the scale, diversity and trends of India's economy. While actions are being taken to fill the gaps, greater effort is needed. A response to this challenge requires **new regulatory programs and approaches targeting different priority sources and combining stronger enforcement mechanisms with greater use of incentives**, using innovative methods tailored to a targeted group of sources and suitable to India. The sources, for which new, special programs are needed include: (i) small and medium enterprises estimated to account for 70 percent of the total industrial pollution load;

(ii) municipal sources of pollution; (iii) multiple industrial and municipal sources contributing to environmental degradation in a particular area or ecosystem; and (iv) linear projects with complex direct and indirect (induced) impacts, such as highways projects. There is also a need to **better account for the vast diversity of regulated sources in setting national regulatory standards,** supported by enhanced economic analysis of the impact on the industry, particularly small scale sector and old, but desperately needed, public utilities. Enforcement efforts are undermined by the lack of credible deterrents, and **the toolkit the regulators use to facilitate compliance needs to be considerably expanded and strengthened** to adequately deal with a very diverse regulated community.

5.6. In addition, **there is a double benefit to regulatory agencies from recognizing and encouraging good behavior and voluntary initiatives by the industry to improve environmental performance** through some regulatory incentives, such as extending the duration of CTO for industries that demonstrated good record of past performance, obtained ISO 14001 certification, or introduced environmental auditing or sustainability reporting. First, it gives an additional (even if small) incentive for other industries to follow and to innovate further. Secondly, it allows SPCBs to focus their scarce resources on serial offenders and other priorities. There is a significant, unrealized scope for providing such support, using good practice examples of selected SPCBs.

5.7. **Matching capacity of regulatory agencies with the growing demands is a major challenge**. The study recommends that the MoEF/CPCB consider requesting and guiding all SPCBs in developing a **medium term capacity upgrading action plan** to meet the current and projected workload, including the requirements of the Right to Information Act (RTIA) and the expected level of court cases. These plans should explore possible efficiency gains through rationalizing processes (e.g. linking consent duration to environmental risks and performance of a facility), upgrading technology, decentralizing responsibilities to regional offices, outsourcing of certain functions, etc. It would conclude with a staffing plan, including specific measures to upgrade skills and a well-justified and variable need for additional positions to meet the core needs. The plan could then be used for negotiations with State governments over additional staff positions.

5.8. The system of oversight needs to be strengthened between the center and States with respect to **greater accountability for the level of performance.** The MoEF and CPCB can also consider *introducing a performance-based program of support to SPCBs,* which would reward for exceeding the agreed performance targets, in addition to the "needs-based" technical assistance to SPCBs with particularly low capacity (e.g. new and/or poorer States). Improving efficiency and accountability of the *forest departments* in providing forestry clearance and performing compensatory afforestation was further cited as a key issue for all developers, particularly in the hydropower, transmission and highways sectors.

5.9. The study also confirmed the lessons from environmental management experience worldwide highlighting **a fundamental need for sectoral agencies to facilitate better environmental compliance and performance** of individual projects, more sustainable development of the sector as a whole and greater cross-sectoral coordination, particularly at the planning stage. Case studies and sector reviews show that environmental monitoring and enforcement cannot improve the situation on the ground if environmental factors were not considered at the time of location decisions, spatial planning, project design, and technology choices. Sectoral agencies and local governments are typically better positioned to influence these choices than the environmental regulator. The report identifies specific

recommendations for government authorities in each sector, summarized in Annex 1.

5.10. The study also found some important **common themes**, which were highlighted by all stakeholders of environmental management and could serve as good entry points towards working together and building a constructive partnership. These action areas include: (i) better access to training, knowledge and capacity enhancement; (ii) maximizing opportunities provided by the RTIA to leverage improved dialogue and environmental performance, and (iii) improving cross-sectoral coordination, particularly involving environmental authorities in the early planning and design stages of large infrastructure and industrial development projects.

5.11. A review of issues involved in fostering cross-sectoral coordination and designing area-wise programs to arrest aggregated pollution from industrial clusters and multiple sources in the area, suggest that **devolving more powers to and building capacity of local governments** set in motion by the 73rd and 74th Constitutional amendments, would be necessary. Empowered and capable local government bodies would have a natural incentive (which sector agencies lack) to promote cross-sectoral integration and oversee environmental management programs aimed at measurable improvement of environmental quality in the areas of their jurisdiction, with the participation of all concerned sectors, as well as citizens.

5.12. **An environmental agenda that the country is facing is of immense proportion**. The needed institutional changes and improvements on the ground will require commitment to a long-term program of actions. Many of the measures would involve further examination, design, and, not least, consultation with the public, other government agencies, and the regulated community. It will also require that environmental agencies, sectoral institutions, and the general public patiently *work together* to make progress, as evident from a set of study recommendations presented in a summary table in Annex 1. Encouragingly, several steps and initiatives setting the right direction have been taken recently by various players, including environmental regulators and sectoral agencies at the central and State level, as noted throughout the report.

5.13. It would be important to move quickly towards reaching a broad agreement with all major stakeholders on priority actions, based on the identified list (Annex 1), and **develop a medium- to long-term program of implementing the agreed actions**, supported by necessary resources, monitorable targets and clear accountability mechanisms. The Charter on Corporate Responsibility for Environmental Protection drawn up jointly by the industry and MoEF/CPCB sets a good example of a collaborative process to expand upon.

5.14. The most important highway that India is yet to build is a road into an environmentally sustainable future. The time for public consultation is now, and the country cannot afford but to make it a best practice project. With India's outstanding human capital, knowledge edge, technological genius and sense of social responsibility, there is every opportunity for this to happen.

Annex 1. Summary of Study Recommendations

Key Issues	Actions	Responsible Institutions	Timeline
Promote public participation	Develop a national program on public participation, including: • Programs for raising community knowledge and capacity • Guidelines and training to SPCBs on public consultation • Programs to involve citizens in monitoring and enforcement	MoEF/CPCB, in consultation with SPCBs and civil society	Short to medium term (1–3 years)
	Develop sectoral guidelines and training on public consultation	Sector agencies	Short term(1 year)
	Disseminate examples of when public participation improved project performance	Sector agencies	Short term (1–2 years)
	Share local knowledge with environmental and sectoral agencies	Civil society	
Improve access to knowledge and training	Publicize the Information and Facilitation Center and create its offices in other locations	MoEF, State DoE	Short to Medium term (1–3 years)
	Develop and regularly update public online database on environmental indicators	MoEF/CPBC	Short term, then continuous
	Upgrade and expand targeted training programs by industrial associations and/or sectoral research and training institutions	Sector agencies and institutions	Short to medium term (1–3 years)
	Maximize effectiveness of the Right to Information Act by developing clear procedural guidelines regarding requests for information	MoEF, sectoral ministries	Short term (1 year)
	Disseminate relevant information to affected communities	Civil society	Continuous
Develop new programs targeting SME	Develop a focused and *well–packaged* regulatory program for SME clusters that integrate targeted enforcement with compliance assistance, including a funding mechanism to provide matching grants to SMEs participating in the program	CPCB and SPCBs	Medium term (2–3 years)
	Provide training and capacity building to SMEs on business opportunities from better EM	Industrial associations with CPCB/SPCBs	Short to medium term (1–3 years)

	Develop greening supply chain and industry mentoring initiatives	Industrial associations	„
	Initiate community monitoring of SMEs	Civil society	„
Set feasible standards for a diverse regulated community	Strengthen the instrument of an economic impact assessment of new regulations by developing a clear methodology drawing on best international practice and adjusted to India's economic context	MoEF/CPCB	Medium term (2–3 years)
	Review best international practice procedures for standard setting and develop guidelines for India; strengthen/expand the application of the zoning concept in setting national standards	MoEF/CPCB	Short to medium term (1–3 years)
	Provide necessary economic information, collaborate on the analysis and facilitate consultation with industry	Sectoral ministries/agencies	„
	Provide information on community impacts of the proposed standards	Society organizations, academia	„
Strengthen monitoring and enforcement	Evaluate, expand and strengthen the bank guarantee system	MoEF/CPCB	Short to medium term (1–3 years)
	Explore other innovative regulatory approaches to overcome the lack of credible sanctions	MoEF/CPCB	
	Periodically update sectoral guidelines for monitoring, and adding new sectors of growing impact such as highways	CPCB and SPCBs	Medium term (2–3 years)
	Adopt and implement a plan to improve effectiveness of monitoring, including greater use of CEM technology and self monitoring data	„	Short –long term (1–5 years)
Promote good environmental performance by sectors	Develop a set of regulatory incentives to support voluntary initiatives, using existing good practices	CPCB/SPCB	Short to medium term (1–3 years)
	Coordinate the development of a strategic framework for using global environmental financing instruments	MoEF with sector agencies	Short to medium term (1–3 years)
	Promote self-monitoring and self reporting	Sector agencies and business associations	
	Develop sector rewards for good compliance/performance	„	

	Provide information and TA on compliance	„	
Improve cross-sectoral approaches and coordination	Develop "new generation" area-based pollution management programs dealing with multiple sources that focus on ambient quality outcomes	CPCB/ SPCB, local government, sectors and community	Medium term (2–3 years)
	Empower local government to oversee regional environmental programs and foster cross-sectoral coordination	State DoE/SPCB in consultation with sectors and civil society	Medium term (2–4 years)
	Develop roles and responsibilities of various stakeholders	Local government SPCBs	Short to medium term (1–3 years)
	Involve the community in monitoring of other sources of pollution in the area		
	Strengthen existing formal mechanisms to involve environmental authorities in project/program planning and design	State DoE, SPCB, industrial and urban development agencies	
	Facilitate uptake of best practices with the integration of environmental zoning atlases by SPCBs with industrial and urban development plans and locational decisions		Medium term (2–3 years)
Build capacity of the regulator	Identify and undertake measures to rationalize key processes, outsource non-core technical functions, and devolve more responsibility to regional offices	SPCBs	Short to medium term (1–3 years)
	Maximize potential of modem monitoring technology (such as CEM)	CPCB and SPCBs	Medium term (2–3 years)
	Develop and implement medium-term capacity strengthening action plans, as well as training and staffing plans to meet growing mandates	SPCBs with CPCB support	Medium term (2–3 years)
	Review and recommend measures to improve the forestry clearance process	MoEF/State forests agencies	
Strengthen accountability for regulator performance	Strengthen an oversight program for SPCBs, including: • detailed oversight guidelines • regular assessment of the SPCBs performance based on a clear set of indicators	CPCB in consultation with SPCBs	Medium term (2–3 years)

	• introducing a system of performance-based incentives		
	Improve efficiency, transparency and accountability in the forestry clearance process, including • handbook on definitions and classification of forests land • updating database of forest land • aligning purchase of land for compensatory afforestation (CA) with project schedule • review/update NPV calculation methodology and avoid double counting with CA	MoEF in consultation with sector agencies	Medium term (2–3 years)
Specific recommendations for industry sector	Integrate environmental objectives in the State Industrial Policy	State DoI	Short to medium term (1–3 years)
	Link industrial promotion incentives to environmental performance (e.g. via environmental performance bonds)	IDA and industrial associations	Short term (1 year)
	Encourage and advise on voluntary initiatives, mentoring programs for SSIs	IDA and industrial associations	Medium term (2–3 years)
	Provide information and training on clean technology, management practices and related business opportunities	Industrial associations	Long term (Continuous)
	Utilize public green rating programs	Civil society	
	Expand citizen monitoring of industries	SPCBs and local government	
Specific recommendations for power sector authorities	Develop a consistent framework for integrating externalities and use it as input into a consistent and realistic set of standards and regulations related to power sector	MoP /CEA with MoEF/ CPCB	Short term (1–2 years)
	Integrate stricter environmental performance and energy efficiency requirements in coal R&M program, in accordance with latest trends in mitigating the impacts of coal power	MoP, SEBs, NTPC, Power Finance Corporation (PFC)	Medium to long term (3–5 years)
	Develop incentives to coal plant operators for better ash management and disposal	MoP, SEBs with CPCB/SPCB	Short term (1 year)
	Focus support to energy efficiency on high impact initiatives, including	MoP, Bureau of Energy	Short to medium term

	support for new energy efficiency lending business	Efficiency	(1–3 years)
	Initiate capacity building of State electricity regulators to create a stable regulatory environment for renewable energy at State level	MNES, State Electricity Regulatory Commission	Short to medium term (1–3 years)
	Explore innovative financing instruments and accelerate R&D to support future development of the sector via global climate change agenda	MoP, Power Finance Corporation with MoEF, CBCP	Short to medium term (1–3 years)
	Include environmental performance indicators in MoP database and annual reports	MoP with MoEF	Short term (1 year)
Specific recommendations for highways sector	Develop sectoral guidelines to overcome specific identified knowledge gaps (see report for the list)	MoRTH and NHAI	Short term (1 year)
	Integrate environment management measures in Indian Roads Congress codes and MoRTH specifications and establish a system of periodic revision	"	Short to medium term (1–3 years)
	Develop a manual for translating EMPs in contract clauses, and for them to be incorporated in contract documents	"	Medium term (2–3 years)
	Citizen monitoring and oversight of construction impacts	Civil society	Continuous

Glossary of Terms

Area-based environmental management	A practice of managing all natural and physical resources in a holistic manner or integrated systems, rather than managing each individual resource as a single component. The approach may have other dimensions including the structure and processes within and between central and/or local government agencies to manage natural and physical resources. It also recognizes such things as the interconnectedness and intrinsic value of ecosystems, community values, and the interests of current and future generations in the management of resources
Assimilative capacity	The capacity of a natural system to accept and process anthropogenic inputs or perturbations without any deleterious effect
Bank guarantee	An indemnity letter in which a bank commits itself to pay a certain sum in the event of non performance by the party on whose behalf the guarantee is issued or if any other form of default occurs (see also Environmental Performance bond)
Best available techniques	The most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing on principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole
Biochemical oxygen demand (BOD)	A measure of the amount of oxygen necessary to decompose organic materials in a volume of water. As the amount of organic waste in water increases, more oxygen is needed, resulting in a high BOD
Carbon finance	Resources provided to projects to purchase greenhouse gas emission reductions
Carrying capacity	The maximum number of individuals that a given environment can support without detrimental effects
Chemical oxygen demand (COD)	Amount of oxygen required for the chemical oxidation or decomposition of compounds or organic wastes in water
Clean Development Mechanism (CDM)	An arrangement under the Kyoto Protocol allowing industrialized countries with a greenhouse gas reduction commitment to invest in emission reducing projects in developing countries as an alternative to what is generally considered more costly emission reductions in their own countries (see also Kyoto Protocol)
Command and control instruments	Institutional measures aimed directly at influencing the environmental performance of polluters by regulating processes and products used, by banning or limiting the discharge of certain pollutants, and/or restricting activities to certain times and areas
Economies of scale	The decrease in unit cost realized through operational efficiency as a firm expands its scale of production

Environmental auditing	A management tool comprising a systematic, documented, periodic and objective evaluation of the performance of the organization, the environmental management system and processes aimed at protecting the environment by facilitating management control of environmental protection and assessing compliance with company policies
Environmental Impact Assessment (EIA)	A tool to identify and evaluate the potential impacts (beneficial and adverse) of projects/operations on the environment as an integral part of planning process
Environmental Kuznets Curve (EKC)	An inverted U-shaped relationship between a country's per capita income and some measure of environmental degradation. Environmental degradation first worsens during the course of economic growth and then later improves
Environmental Management System (EMS)	A set of processes and practices which enables an organization to identify, monitor and control its environmental impacts. An EMS is part of the overall management system that includes organizational structure, planning activities, procedures, and resources for developing, implementing and maintaining environmental policy. (see also ISO 14001)
Environmental performance bond	A deposit that polluters must pay to a certain environmental fund once an agreement on environmental performance is violated (see also Bank guarantee)
Externality	An effect of a decision/action by one set of parties on others whose choice and interests were not taken into account
Integrated pollution management	See area-based environmental management
ISO 14001	An international standard for environmental management systems certified by The International Organization for Standardization. It details the required elements following five principles: commitment and policy, planning, implementation, measurement and evaluation, and review and improvement (see also EMS)
Kyoto Protocol	An international agreement reached in Kyoto at the Third Conference of the Parties to the UN Framework Convention on Climate Change in 1997. The Protocol established specific targets and timetables for reductions in greenhouse gas emissions to be achieved by the framework's signatories (see also CDM)
Life Cycle Assessment (LCA)	a quantification of the level of energy and raw materials used as well as the solid, liquid and gaseous wastes produced at every stage of a product's life or process
Moral hazard	A situation in which one of the parties, after an agreement is made, has an incentive to act in the manner that bring benefits at the expense of the other party and not comply with the agreement

Net Present Value	An assessment of the future stream of costs and benefits of an operation where the overall profit or loss is expressed in terms of current monetary values
Not In My Back Yard (NIMBY)	An acronym that denotes the propensity of local citizens to insist on establishing necessary (environmental) facilities anywhere but in their own community
Panel regression	A regression technique that allows for both cross-sectional and time-series dimension of data to be analyzed (see also Regression)
Performance bond	See environmental performance bond
Public good	A good that is both non-excludable and non-rival. A good is non-excludable if it is not possible to prevent anyone from consuming the good once it has been made available to the public. A good is non-rival if consumption of that good does not reduce the quantity available for consumption by someone else
Public interest litigation	Litigation filed in a court of law, for the protection of public interest including pollution, terrorism, road safety, constructional , etc.
Regression	A statistical technique used to evaluate the associations between one variable and one or more other variables
Supply chain	The progression of businesses involved in the supply and purchase of materials and goods from raw materials to the final product
Volatile organic compounds (VOCs)	A class of chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. They are the prime ingredient in the formation of ground-level ozone or smog which can damage lung tissue, cause respiratory illness, and also harm farm crops
Voluntary agreement/initiative	A contract between the public administration and industry in which a firm/a group of firms agree to achieve certain environmental objectives

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